



Production Line Modification Using Improved Design of Rolling Table

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Abstract— Throughout the years a ton of work has been done is as yet proceeding with awesome push to spare weight and cost of uses. The present pattern is to give weight/financially savvy items which meet the stringent prerequisites. The point of this paper is to examine existing transport frameworks and improve the basic parts like ball exchange units, C-channels for skeleton and backing, to minimize the general weight of both get together and material sparing.

Index Terms—Conveyer systems, ball transfer units, chassis, weight/cost effective products

I. INTRODUCTION

A transport framework is a typical bit of mechanical taking care of gear that moves materials starting with one area then onto the next. Transports are particularly helpful in applications including the transportation of substantial or cumbersome materials. Transport frameworks permit brisk and proficient transportation for a wide assortment of materials, which make them extremely famous in the material taking care of and bundling commercial enterprises [1]. Numerous sorts of passing on frameworks are accessible, and are utilized by different needs of various commercial enterprises. Transport frameworks are utilized broad over a scope of commercial ventures because of the various advantages they give.

- Conveyors can securely transport materials starting with one level then onto the next, which when done by human work would be strenuous and costly.
- They can be introduced anyplace, and are much more secure than utilizing a forklift or other machine to move materials.
- They can move heaps of all shapes, sizes and weights. Likewise, numerous have propelled security includes that anticipate mishaps [3].

There is an assortment of choices accessible for running passing on frameworks, including the pressure driven, mechanical and completely mechanized frameworks, which are prepared to fit individual needs. Numerous components are vital in the exact determination of a transport framework. It is imperative to know how the transport framework will be utilized already. Some individual ranges that are useful to consider are the required transport operations, for example, transportation, gathering and sorting, the material sizes,

weights and shapes and where the stacking and pickup directs need toward be considered.

Types of Conveyor Systems

- Gravity Conveyor systems
- Powered Belt Conveyor systems
- Pneumatic conveyor systems
- Vibrating conveyor systems
- Flexible conveyor systems
- Vertical conveyor systems and spiral conveyors
- Live Roller Conveyor systems [1]

A. Problem Statement

The point of this work is to change creation line utilizing enhanced stoop of roller table (incorporates legitimate material determination, better exchange units) which will lessen human endeavors; time required for the operation and at last cost of operation.

II. LITERATURE SURVEY

1. Design and Analysis of a Roller Conveyor System for Weight optimization and Material saving

Suhas M Shinde & R. B. Patil et al discuss about existing conveyor systems and optimization of critical parts like ball transfer units, C- channels for chassis and support and variety of material that can be used for table, to minimize overall weight and cost of the assembly and material saving. It is concluded that existing design calculations shows that, the factor of safety is very greater than the requirement and there is a scope for weight reduction. 30.9% of weight reduction is due to optimized design. [1]

2. A Review paper on Redesign of Gravity Roller Conveyor System for Weight Reduction through optimization

Sanket Pandit & A. G. Thakur et al presents an application of concept of concurrent engineering and the principles of design for manufacturing and design for assembly, several critical conveyor parts were investigated for their functionality cost and ease of assembly in the overall conveyor system. The critical parts were modified and redesigned with new shapes and geometry and some with new materials. The improved design methods and the functionality of new conveyor parts were verified and tested on a new test conveyor system designed, manufactured and assembled using the new improved parts. It is concluded that, with newly designed values of various parts there is improvement in the functionality cost and ease of the assembly. [2]

3. Static Analysis of a Roller of Gravity Roller Conveyor for Structural Strength & Weight Optimization

S. S. Gaikwad & E.N. Aitavade et al made an attempt to reduce weight of the existing roller conveyor by optimizing the critical parts of (e.g. Roller,) conveyor without hampering its structural strength. The existing Roller conveyor designed is considered for this project work. Optimization is carried out by modifying the dimensions of roller. Then analysis of optimized roller is carried out to find out maximum deflection & stress. As such, the existing roller conveyor structure is tested for its mechanical strength over the shop-floor while a trial is taken using optimized designed rollers of assembly and with the real-time components of the excavator. It is concluded that Critical parameter which reduces the weight is roller outer diameter and roller thickness. Though value of deflection, stress is more in case of optimized design, but it is allowable. Actual physical model is done for validation using optimized design parameters and it is found that the design is working safely. [3]

4. A Review on Design of Live Roller Conveyor System

Ashveer Singh & Shashank P Joshi et al presents the comparative study of results and outcomes of designing the powered roller conveyor and components for typical requirement of different application which makes the system unique from general purpose roller conveyors. The design of roller conveyor mainly depends upon the loading conditions in particular application. The design as well as the component selection will change as the loading condition changes. Various types of rollers in different industrial applications were studied by these researchers. It is concluded that Chassis have several point loads over its length at particular pitch and the columns are under axial load which creates the buckling. So accordingly each component should be selected and design. [4]

5. Study and Analysis of Roller Conveyor in Material Handling

Imran S Khan & Ravindra Gandhe et al discusses various needs and importance of conveyor systems in industries. The main objective of this study is to explore the analysis of a

roller. This has entailed performing a detailed static analysis. The study deals with static analysis. Analysis has been carried out by stainless steel (conventional material). The results such as total deformation, equivalent elastic strain and equivalent stress have been determined. [5]

6. Design and Optimization of Roller Conveyor System

D. K. Nannaware & R. R. Kharde et al discusses existing conveyor systems and optimized critical parts of roller conveyor system like Roller, C-channels for chassis and support, to minimize the overall weight of assembly and material & cost saving. Result shows safe design of optimized design. Optimization gives optimum design for same loading condition with huge amount of weight reduction. Using optimized procedure and using practical available structure 39.26% weight reduction is achieved. [6]

III. WORKING PRINCIPLE

It works on the principle of momentum and compound angle. It consists of ball transfer units which help to maintain the momentum. A Ball transfer unit assists sheets to reach the destination which is a corner of the table fixed with gauge. Gauges can vary in shapes according to shape of the material which need to be transferred. Sensors located nearby gauges; help to locate the sheets and commands robotic arm to pick up sheet for further operations. Compound angle is provided such that sheet should slide from any point of the table reaches only to the fixed particular location. Also, spring returns stoppers are provided which prevents rebounding of sheets.

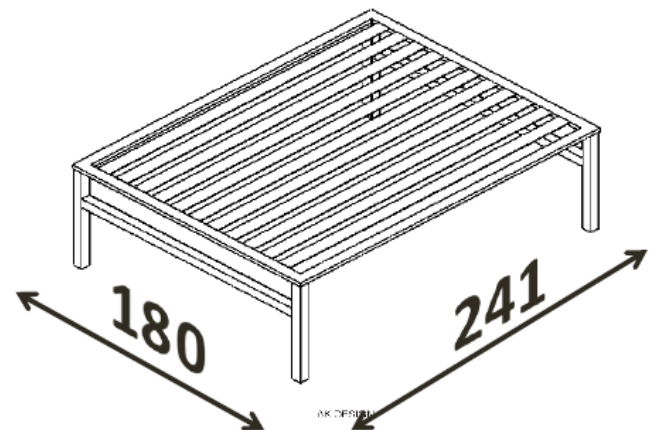


Fig.1 Structure of rolling table

IV. WORKING

Major components of Rolling Table are:

- A. Chassis for support
- B. Ball transfer unit
- C. Sensors
- D. Gauge with different shapes
- E. Spring return stoppers

This table mainly used, to bring some modification in the production line of industries. This will automatically lead to transportation of material with less human efforts in less time

and will ultimately saves total operation cost. With proper selection of material and with good design calculations this can be achieved. Here proper material should be selected for chassis, which is supposed to withstand variety of loads for variety of materials and also it should be light in weight.

going to rests after sliding from another point of the table. Mostly gauge will be of work piece shape which will easily detachable. Table provided with accurate value of compound angle will transfer work piece to the particular corner of the table fitted with gauge, even if they are slided form any point of the table. Then sensors located nearby will give command to programmable robotic arms which will pick up the work piece for final operation.

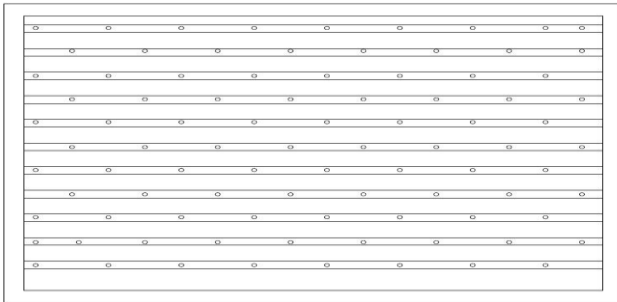


Fig.2 Structure of the upper surface of table

Spring return stoppers will be fitted in between transfer units on the upper surface of the table according to shape of the work pieces. This will prevent rebounding of sheets and will improve efficiency of the operation ultimately.

- A. Binding press
- B. Fabrication Industries
- C. In some areas of Food Processing Industry
- D. As whole setup is mainly mechanical, so it can withstand even in high temperature applications.

V. ADVANTAGES

- A. As electronics parts are less, so less possibility of errors.
- B. More reliable.
- C. Fewer Inventories Cost.
- D. Operation and Maintenance cost are very less.
- E. Light in Weight as compare other bulky conveyor systems. Easily portable, hence can be used in batch production.
- F. No need of skilled operator.

VI. LIMITATIONS

- A. It is not suitable for project based industry which always seeks for modification of production line.
- B. If sensors stop working then whole operation will get disturbed as dependency of systems on each other.

VII. APPLICATION AREAS

Standard Ball transfer unit mounted on the upper surface of the table is going to transfer material to the desired location. Where, gauge will be fitted with nearby sensors. Gauge will be fitted in one corner of the table where material (sheets) is

- Automobile Manufacturing Industry.
- Mechanical Industries which mainly concerned with sheet works.(Stamping sector).
- Consumes more time as compare to other automated conveyor systems.

VIII. FUTURE SCOPE

As the world is progressing at faster rate we need more efficiently working equipments. Also, this Roller Table can be used more efficiently if some modifications are done. These modifications are as follows:

- Easily portable upper surfaces (whole surface) of the table. So that it can be subjected to variety of loads.
- Automation for replacement of Gauges.

IX. CONCLUSION

This project work has provides us an excellent opportunity to use the subject knowledge of Design of Machine Elements and Strength of Materials to minimize human effort & work efficiently in less available space gain. Further modifications will put this work in the main league of use. This concept saves time & energy which leads to efficient working. After reviewing these literature papers one can easily establish the idea about the loading condition This project work has provides us an excellent opportunity to use the subject knowledge of Design of Machine Elements and Strength of Materials to minimize human effort & work efficiently in less available space gain.

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