Automatic monitoring & control system for object in belt conveyor

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Abstract

The applications of conveyer are increasing day by day in the manufacturing industries due to its flexibility and accuracy in material handling. Industries like packaging and food processing uses conveyer for the rapid production and less power utilization in material handling. In general, only a single type of object like tablets, bottles or trays are monitored and controlled on a single conveyor in pharmaceutical industries. The trays or boxes on the conveyor are to be stopped at the required station and material to be filled in the trays on conveyor. This can be done using the induction type proximity sensors and counters placed at different positions in the system. The IR sensor is used for safety as interlock the material handling system. In given system, we can do the design and fabrication of automatic tablet counting & shifting mechanism in belt conveyor used in the packaging & transportation system in tablet packaging for pharmaceutical industries. The number of trays/boxes to be filled by tablets can be transfer by using arrangements of proximity sensors & pneumatic locking along with counting system. The output packaging fixed can be easily altered in between the process.

Keywords – objects, packaging, counter, pneumatics, belt conveyer...*etc.*

1. Introduction –

A conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another. Conveyor systems are commonly used in many industries, including the automotive, agricultural, computer, electronic, food processing, aerospace, pharmaceutical, chemical, bottling and canning, print finishing and packaging. Although a wide variety of materials can be conveyed, some of the most common include food items such as beans and nuts, bottles and cans, automotive components, scrap metal, pills and powders, wood and furniture and grain and animal feed. Many factors are important in the accurate selection of a conveyor system. It is important to know how the conveyor system will be used beforehand. Some individual areas that are helpful to consider are the required conveyor operations, such as transportation, accumulation and sorting, the material sizes, weights and shapes and where the loading and pickup points need. conveyor provides one of the most versatile & economical means of moving product conveyor can quickly move large quantities of items in virtually any direction with a minimum of effort & expense. They can use in both permanent & portable applications. In existing design, there is scope of automation & process optimization of this conveyer components which will be used for tablets packaging.

2. Problem Statement –

In existing system for material handling in tablet packaging & transportation there are time requirement & manpower involves more problems due to manual handling & packaging in small scale pharmaceutical industries. There is only belt conveyer having automation operating by using electronics system but it does not have any provision for counting & box packing arrangements for tablets. so, to overcome this problem we can implement the automatic tablet counting & shifting mechanism in belt conveyor with automation in starting & stopping system.

3. General Information –

3.1. Purpose–

The main objective is to suggest for belt conveyor for material optimization. The following are important points regarding this objective of study –
Study existing system and its design.

1) Geometric modeling of belt conveyor.
2) Recommendation of new solution for process optimization.
3) To reduce the effort & power consumption during packaging.
4) To maintain the accuracy in packaging.
5) To develop automation unit, so that m/c can easily be adopted in today's automated packaging plants.
6) To make a machine at low cost, low maintenance, low capital investment in less space.
7) To perform the most rigid operation with high speed packaging.

3.2 Scope –

1. Convenient installation –
The equipment can be installed in the normal operating state of the conveyor belt without stop.
2 Accurate collection-
Detection card with 0.8mm×0.8mm resolution rate can completely shoot every detail of the entire rubber belt.
3 Simple operation-
After completing installation, unattended operation and normal operation can be adopted for it during the entire process of daily detection.
4 Efficient algorithm
The EM algorithm acceleration database is adopted which shortens calculating time, and 10G data can be processed within 30min.
5 Accurate detection
6 Reliable protection
Enclosure protection grade of IP57; X-ray source leakage dose is greatly lower than the value range permitted by national standards, and the leakage dose within 5cm around the equipment is ≤5μGy/h.
7 Complete models.

4. Working –

As shown in fig.4.1.the machine is consisting of mainly belt conveyer & pneumatic tablet locking system. Initially tablets strips are flows from the belt conveyer & slide down from conveyer to final end destination. The belt conveyer is having belt drive system. When tablets reach to final end destination it passes through proximity switch which locks & counts number of tablet strips. Initially pneumatic locking arrangement of tablet counter gets OFF & when 10 tablets are counted it signal is passes to solenoid valve, so that the compressed air is flows through the solenoid valve to double acting cylinders to unlock the arrangements & counted strips fall on boxes on another secondary conveyer. That procedure is repeated continuously to manage packaging time.

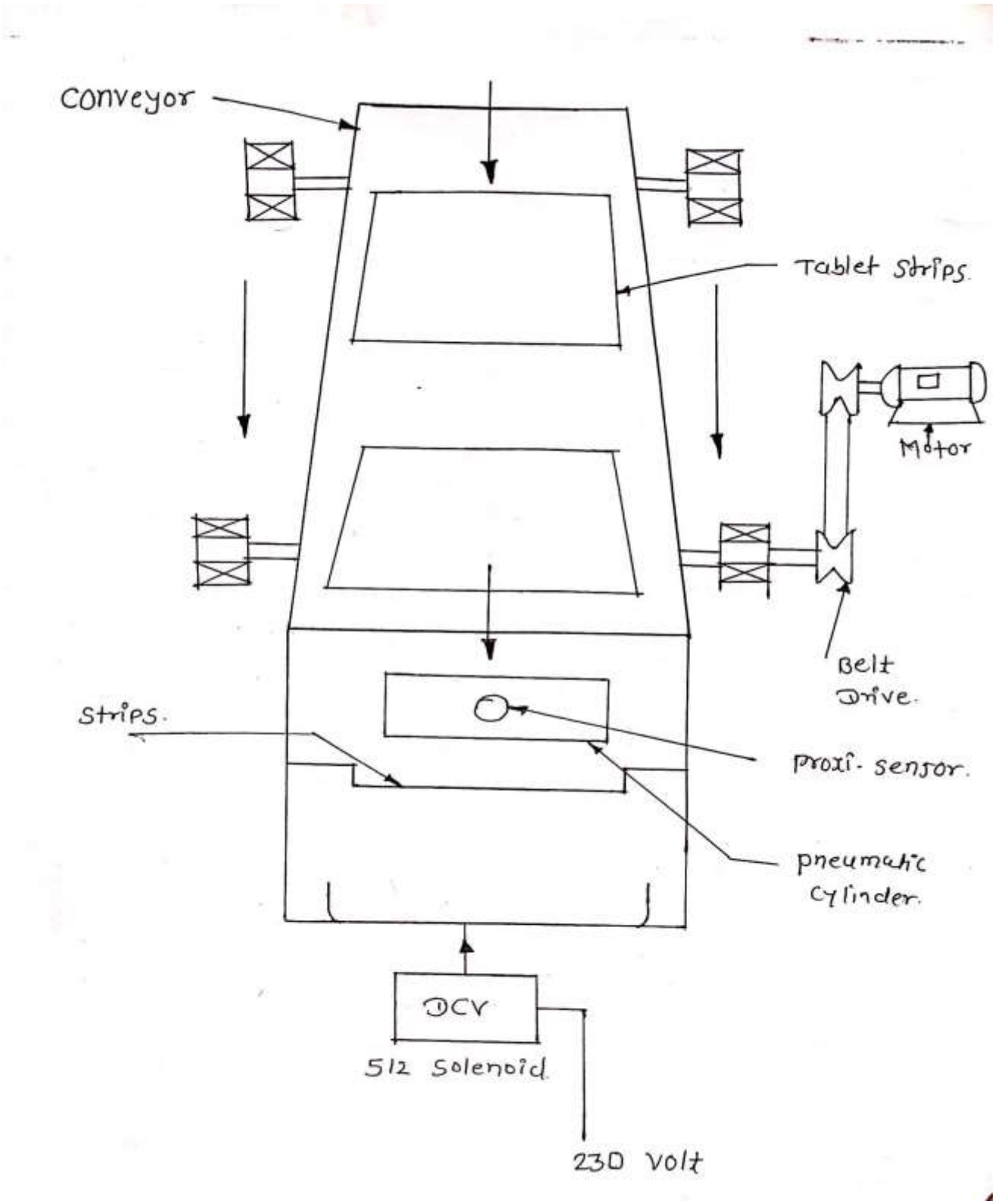

Fig.4.1. Automatic monitoring & control system for object in belt conveyor.

5. Methodology –

The below flow chart shows the sequential operation/steps that will be performed during the project process.

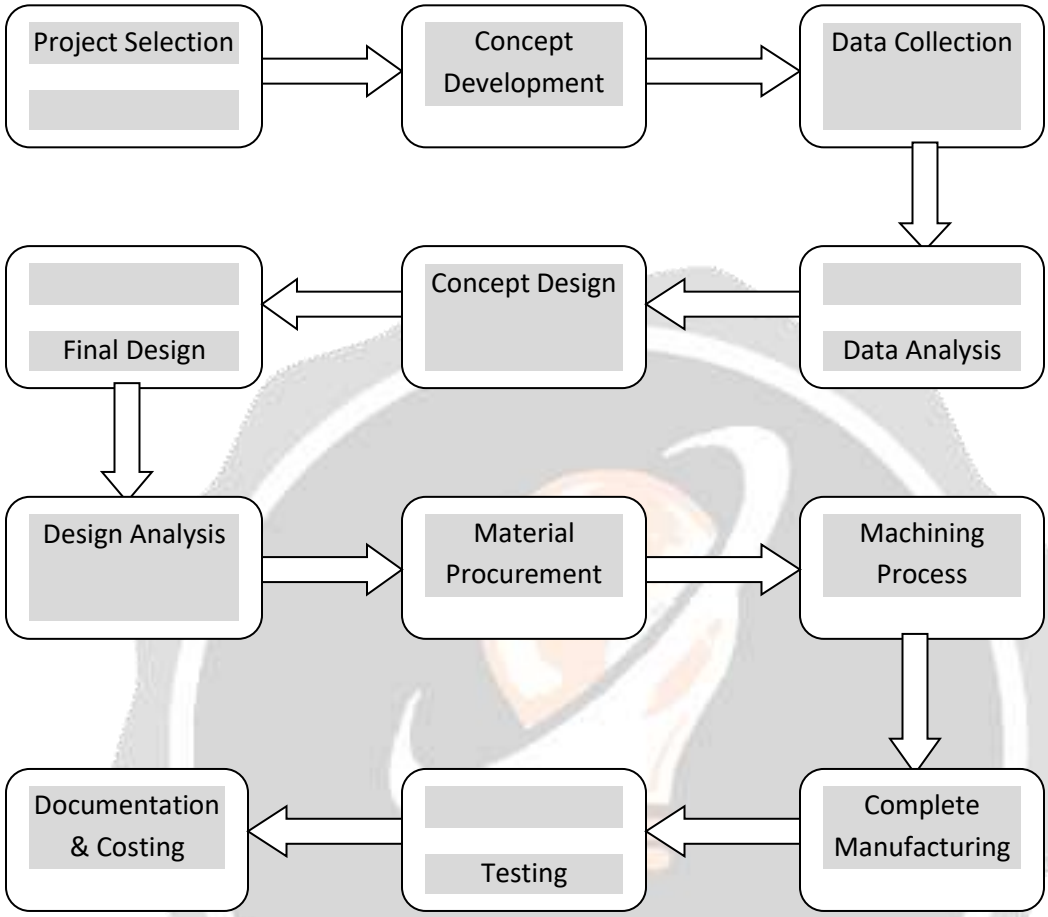

Fig- Methodology

6. Application –

1) This conveyor can use in pharmaceutical industry for box packaging with tablets on belt conveyer.
2) This conveyor used in pharmaceutical industry for counting the tablets.

7. Advantages-

1) System can work on the low power & time consumption as compare to the old methods.
2) The operation of the new machine is well controlled, Well balanced system.
3) It increases the efficiency of old packaging methods in low cost application machine.
4) Machine packaging time will be less.
5) Only simple support structures are required Design & fabrication is easy.

8. Disadvantage-

1. Initial running cost is high.

2. Only used for small scale industry.

9. Conclusion –

The main aim of project to save money & time. The new system is economical and Automic system for controlling the belt conveyor.The main purpose of this new system to improve efficiency of old packaging and counting of tablets in low cost application machine.

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