Investigation And Improvement of Conveyor System

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Abstract- *This investigation examines the cap packaging conveyor system and its impact on the overall efficiency of caps packaging plants at Bericap Pvt limited India .The purpose of this study to demonstrate the existing opportunity to reduce caps unit cost. increase the productivity, decrease the risk of work related injuries and improve the line reliability along with employee moral with conveyor system alone .Data gathered for this study in three ways; One caps packaging line operator were required to documentation and start time of the conveyor system on their respective line of six weeks .A conveyor machine operator was require o document the start and stop of the conveyor system itself along with the cause of the same six weeks. Three, a packing conveyor system from randomly submitted to 51 employee soliciting there opinion and suggestion for the conveyor system. Conclusion of the study show opportunity to improvement and over wheeling disapproval (88%) of the current system and three improvement proposal where determined based on all data collected.*

Keywords- Cpsm, Idler, Sdt, conveyor

I. INTRODUCTION

In early world enter in industrial age and begin manufacturing goods. Finished good can be anything from an automobile to a hamburger at a fast food restaurant. Raw material is shifted in a process, an ultimately turned into sellable goods. This good can be warehoused or sold immediately after production. In Bericap India Pvt Talegaon, Pune there is cap packaging plant where nutritional supplement product manufactured. There 30 Manufacturing line where raw material (resins)are placed into funnel ,Embossing and debossing labeled , and send to distribution warhouse via a conveyor system .

Conveyor system is used in many industry to transport good and materials between stages of process .Using conveyor system is a good way to reduce musculoskeletal injury in task or process that involve manually handiling , the reduce the need for repetitive lifting and carrying .Conveyors are powerful handiling tool they offer the opportunity to boost the productivity ,reduce product handling and damage , and minimize the labor requirement .All lifting and conveying machine can be divided by their operating principle into two large groups (1)Intermittent motion (2)Continuous motion Intermittent motion includes all types of cranes ,lifts , surface transport ,aerial tramways and cables ways , scrappers . Continuous motion includes conveyors, pneumatic and hydraulic transport means etc. which may generally called continuous transport machine or conveying machine. Continuous machine are characterized by nonstop motion of bulk or unit load along a given path, without halts for loading and unloading.

II. PROBLEM STATEMENT

Due UDT (Unscheduled down Time) productivity also decreases the unit cast of caps is high. More chance of employee injury and accident. Unreliability is more efficiency doesn't matches with norms.

III. OBJECTIVES

The purpose of this investigation is to demonstrate the existing opportunity to reduce caps unit cost, decrease the chance of injury and worker compensation claims, and increase the productivity. And improve the reliability by improving the conveying system alone.

IV. METHODOLOGY

The objectives of this investigation will be accomplished by collecting data in two ways:

1. For three months accurately track how long and offended manufacturing lines are waiting on conveyor system access. Whenever there is no access, each line will have an employee record the start and stop times of the conveyor system. The conveyor system operator will also record all the system downtime due to jam and machine malfunction.

2. Allow employee to give feedback on the conveyor system and its performance. A packing conveyor system project form will be generated and randomly submitted, asking employee questions regarding the conveyor system. These questions were derived from interview with employee who use the equipment and one employee who acts as a liaison with the original installer of the conveyor system.

V. RESEARCH METHODOLOGY

Study entire system using conveyor parameters of the existing conveyor system:

- Speed
- Width
- Absorbed Power
- Gear box selection
- Drive shaft

For designing a conveyor belt, some basic information e.g. The material to be conveyed, its lump size, tonnage per hour, distance over which it is to be carried, inclined if any, temp and other environmental conditions is needed.

VI. ANALYSIS AND DISCUSSION

The data collection analysis will be broken into three area of focus:

1. Analysis of the data collection from the employee of each line.
2. Analysis of the data collection from the conveyor system operator.
3. Analysis of the packing conveyor system project form.

Analysis of the data collection from the employees of each line for three months data we tracked by employee by each line. These employees recorded the start and stop time of the conveyor system only when they we not able to use it. From the data it was determine that on average there are 52 minutes losses due to the ineffectiveness of the conveyor system.

Average downtime minutes by line:-

Line numbers	Average Downtime min.
1	18
2	19
3	25
4	32
5	90
6	35
7	38
8	42
9	125
10	99
11	87
12	76
Total	626
Average minutes	52

Analysis of the data collection from the conveyor system operator. In the same time frame, the conveyor system operator also tracks any downtime due to the conveyor system operations. This would include any jams, machine malfunction, etc…. From the data it was determine that there we three major causes of conveyor system downtime, with 8% of all downtime due to "other" or problems that occurred as one time instance with no regularity.

Jams:- This occurs when a tray of caps of one line get jammed with another tray either from a different or the same line when trying to access the main drive, or their may a jam on the main drive itself as trays travels through the conveyor system. This normally occurs at the intersection of the back lines with rhea main drive or when tray gets turned get sideways. The amount of downtime to clear to jams ranged from as little to one minute to 24 minutes depending on the jams location and the number of trays involved this jams always requires a maintenance technician or the conveyor system operator to clear the jam either from a ladder or a lift.

Main panel reset: - This occurs when there is a problem on main drive due to either jams or sensors being blocked. This problem usually requires a reset of the corresponding button on the line and or main panel of the conveyor system. Main panel resets accounted for 10% of all conveyor system downtime.

Caps blocking sensors (Eyes):- This occurs when a tray of caps, due to timing or location, happens to block any one of the numerous sensor in the conveyor system. With the sensor block the conveyor system will shut off and not allow any more trays to be inserted. This problem usually requires a simple reset of the "Clear jam" button on the corresponding line which enters will allow the system to move the tray and restart the normal operation.

Recommendations / Proposals:-

Using the data laddered from both actual conveyor system downtime and employees feedback from the survey, there definitely exist some opportunity to improve the conveyor system. We will present three different proposals to

remedy this problem. Each proposal will be different, will varying in cost, complexity and effectiveness.

Theoretical calculation f existing system –

Data measured with some norms and measurement, measured

1. Diameter of roller = 30cm
2. Length of conveyor = 3500mm
3. Total length of belt =7000mm
4. Density of resins material =1.11Kg/m3
5. Mass of material = 0.09kg
6. Conveyor capacity = 1TPH
7. Width of belt = 600mm

To Find;

1. Belt Speed –

V=$d \times \pi$

V=0.9424m/s

Where, V= belt speed

d =diameter of roller,$\pi = Pi$

2. Belt capacity is a product of a peed and belt cross section area generally belt capacity per seconds is given as.

B.C=$3.6 \times A \times \delta \times V$

B.C=0.2661 Kg/s

Where,

A=belt tension area (m2)

$\delta = material\ density\ Kg/m2$

V=belt speed m/s

The mass of material Mm (live load) per meter (kg/m) loaded on a belt conveyor is given as

Mm=c/3.6*V

Mm=0.294Kg

Where,

C= conveyor capacity

V = Belt speed

Summary:-

The results of the data collected can be summarized into two major areas:

1. Estimated lost cap production due to conveyor system downtime.
2. Employee feedback from survey result.

Estimated lost caps production due to conveyor system downtime , with an average of 52 minutes daily being lost due to the conveyor system, and given average department caps per scheduled minute, and using the department reliability data one can refer that there could have been an additional caps. The materials used of this belt include rubber, PVC, Nylon, Leather etc.

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