Automatic Holding Position and Assembly Mechanism for Live Roller Conveyers

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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 bottles or trays are monitored and controlled on a single conveyor in industries. The trays 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 load sensors placed at different positions in the system. The IR sensor is used for safety as interlock. In given system we can do the Design & fabrication of roller conveyer used in the packaging & transportation system in industries. The number of trays/boxes to be filled can be set in the indexing sequence using pneumatics stopping arrangements & proximity sensors. Trays/boxes after reaching the desired output the system will be automatically stopped/start flow of boxes on conveyer. The output packaging fixed can be easily altered in between the process. These roller conveyer can transfer material either forward or reverse motion similarly its can be capable to hold the box as per requirement at a position by using pneumatic system at for assembly work.*

Keywords: Rollers, material transport, bidirectional, pneumatic hold position

I. 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 is used in many industries to transport Goods and materials between stages of a process. Using conveyor systems is a good way to reduce the risks of musculoskeletal injury in tasks or processes that involve manual handling, as they reduce the need for repetitive lifting and carrying. Conveyors are a powerful material handling tool. They offer the opportunity to boost productivity, Reduce product handling and damage, and minimize Labor content in a manufacturing or distribution Facility. Conveyors are generally classified as both Unit load conveyors that are designed to handle specific uniform units such as cartons or pallets, and Process conveyors that are designed to handle loose Product such as sand, gravel, coffee, cookies, etc. Which are fed to machinery for further operations or mixing It is quite common for manufacturing plants to combine both process and unit load conveyors in Its operations. The conveyors are usually flat belt driven to transport boxes, luggage or other items to different destinations through a network of conveyors. The conveyor systems have scanners that read barcode labels attached to the item to determine the final destination. When the item needs to be diverted to the adjacent conveyor a paddle or push bar will push the item to the adjacent conveyor. The item that is moving down the conveyor is scanned and now has to be diverted to the adjacent conveyor. To divert the item

a mechanical driven paddle or push bar will push the item to the adjacent conveyor. The mechanical diverter is driven on this application by a friction clutch brake. The friction clutch brake is limited to the amount of cycles it can perform per minute, limited torque capacity and high maintenance requirements.

1.1 Objective

The main objective is to suggest for roller conveyor for design optimization. The following are important points regarding this objective of study –

- Study existing roller conveyor system and its design.
- Geometric modeling of roller conveyor.
- Recommendation of new solution for optimization.
- To reduce the power consumption during packaging.
- To maintain the accuracy in production.
- To develop automation unit, so that m/c can easily be adopted in today's automated packaging plants.
- To make a machine at low cost, low maintenance, low capital investment in less space.
- To perform the most rigid operation with high speed packaging.

II. METHODOLOGY

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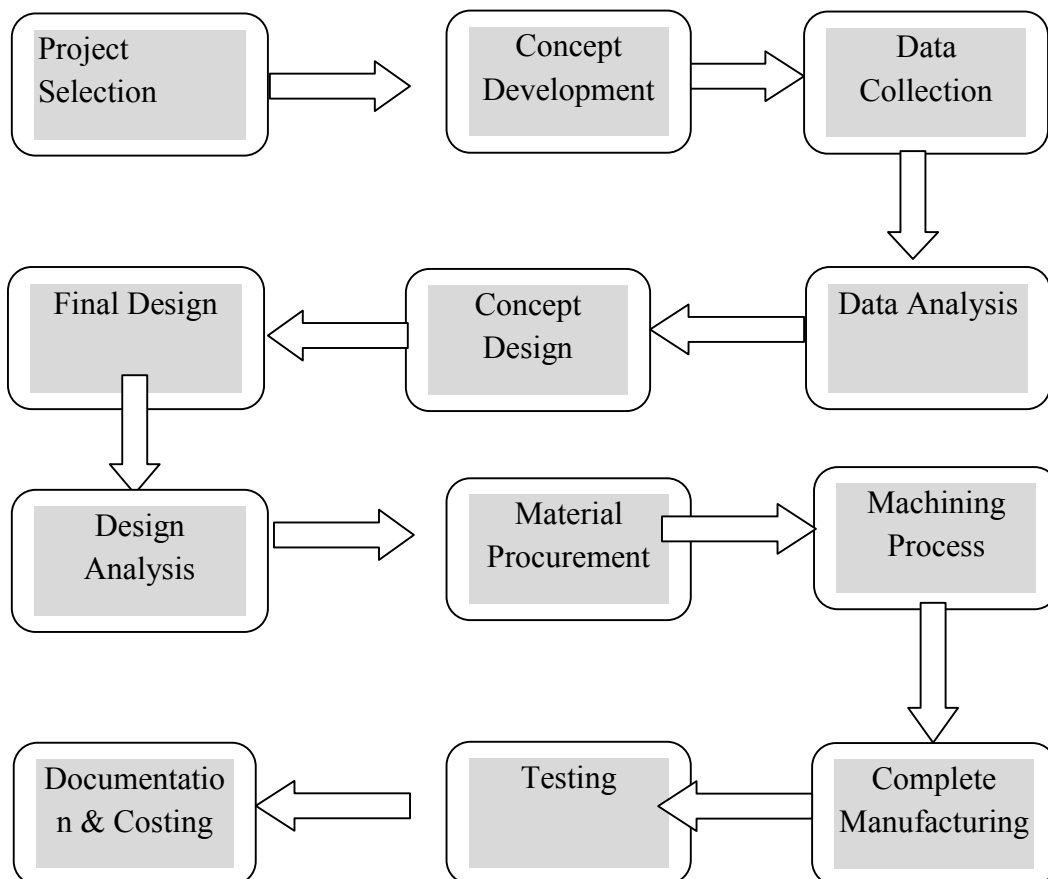
III. FUTURE SCOPE

The scope of project is behind to Design and development of automatic holding & packaging station for roller Conveyor. Is to make an automatic system in material handling which is used for packaging & assembly the objects in industry

IV. WORKING

The machine is consists of mainly roller type live conveyer & pneumatic type box locking & holding system. When we place box or container at inlet side then due to the live roller slide boxes from rollers to final end destination either forward or reverse direction. When we want to hold any box for assembly then box reaches to final end destination of proximity switch it gets ON & that signal is passes to solenoid valve, so that the compressed air is flows through the to solenoid valve to double acting cylinder to lift the box for packaging . After packaging goods in boxes when we dispatch first one box then limit switch is get OFF & cylinder locking arrangement slide down the Box further transport. That procedure is repeated continuously to manage packaging time.

V. ADVANTAGES & APPLICATION

Advantages:

1) It can handle only one job at packaging destination with prepared tome limits.
2) Machine work on the low power consumption as compare to the old machine.
3) The operation of the new machine is well controlled, Well balanced system.
4) It approximately matches the efficiency of old packaging machine in low cost application machine.
5) Machine packaging time is less depending on operator speed.
6) Only simple support structures are required Design & fabrication is easy.
7) It is a faster process.
8) Initial investment is low.
9) More accurate and economical in mass production packaging.

Applications:

This conveyor can use in packaging industries where indexing time can be handle by worker packaging efficiency ex. In pharmaceutical industry for box packing in replacement of belt conveyer.

VI. CONCLUSION

While concluding this project & report, we feel quite fulfill in having completed the project assignment well on time, we had enormous practical experience on fulfillment of the manufacturing schedules of the working project model. We are therefore, happy to state that the in calculation of mechanical aptitude proved to be a very useful purpose.

Although the design criterions imposed challenging problems which, however were overcome by us due to availability of good reference books. The selection of choice raw materials helped us in machining of the various components to very close tolerance and thereby minimizing the level of problem. Needless to emphasis here that we had lift no stone unturned in our potential efforts during study work of the project to our entire satisfaction. The model develop by us fulfill the required objectives that it reduce human efforts & time in transportation & packaging operations. Similarly it maintains the accuracy in this process. It performed the most rigid operation with high speed transportation & packaging. After some modifications in this machine develop automation unit for the transportation & packaging so that machine can easily be adopted in today's automated plants. Hence we are satisfied with our project work.

REFERENCES

[1] S.S. Gaikwad, E.N. Aitavade, "Static Analysis Of A Roller Of Gravity Roller Conveyor For Structural Strength & Weight Optimization" PG student, Prof, Mechanical Engineering Department, Tatyasaheb Kore Institute of Engineering andTechnology, Warananagar, Tal.-Panhala, Dist.Kolhapur-416113, India, International Journal of Advanced Engineering Technology Vol./IV,Oct-Dec.,2013.

[2] D.K. Nannaware, R.R. Kharde, "Design and Optimization of Roller Conveyor System"PG student, Pravara Rural Engineering College,Loni, India, Professor, Pravara Rural Engineering College,Loni, India, International Journal of Scientific & Engineering Research, Volume 5, Issue 7, July-2014.

[3] Suhas M. Shinde, R.B. Patil, "Design and Analysis of a Roller Conveyor System for Weight Optimization and Material Saving"Jawaharlal Nehru College of Engineering, Aurangabad, (M.S.) International Journal on Emerging Technologies Vol.3 Issue 25 April, 2012.

[4] S.H. Masood, B. Abbas, E. Shayan A. Kara "An investigation into design and manufacturing of mechanical conveyors Systems for food processing", Springer-Verlag London Limited 2004.

[5] M. A. Alspaugh, "Latest Developments in Belt Conveyor Technology" MINExpo 2004, Las Vegas, NV, USA. September 27, 2004.

[6] Shirong Zhang, Xiaohua Xia "Modeling and energy efficiency optimization of belt conveyors", Department of Automation, Wuhan University, Wuhan 430072, China Department of Electrical, Electronic and Computer Engineering, University of Pretoria, Pretoria 0002, South Africa 'www.elsevier.com/locate/apenergy'16 March 2011.

[7] Daniel J. Fonseca, Gopal Uppal, Timothy J. Greene, "A knowledge-based system for conveyor equipment selection"Department of Industrial Engineering. The University of Alabama, Tuscaloosa 35487, USA,Expert Systems with Applications 26 (2004) 615–623.

[8] Lihua ZHAO, "Typical failure analysis and processing of belt conveyor" School of Mechanical Engineering, Northeast Dianli University, Jilin City, Jilin Province Changchun Road 169,132012,China, First International Symposium on Mine Safety Science and Engineering,sciverse scince direct, Procedia Engineering 26 (2011) 942 – 946.

[9] Pawar Jyotsna, D.D.Date, And Pratik Satav, "Design And Optimization Of Roller In Belt Conveyor System For Weight Reduction" PG Student, Terna Public Charitable Trust College Of Engineering Osmanabad, India, Associate Professor, Terna Public Charitable Trust College of Engineering Osmanabad, India Proceedings of 10th IRF International Conference, 01st June-2014.

[10] B.E. Gite , Miss. Suvidha R. Margaj,"Carbon Fibre As A Recent Material Use In Construction"Amrutvahini College of Engineering, Sangamner.

[11] Yibowei Moses, Ichetaonye Simon,and Idehenre Maxwell, "Mechanical Properties of Carbon Fibre and Metal Particles Filled Epoxy Composite"Department of Metallurgical & Materials Engineering, University of Lagos-Nigeria Department of Polymer & Textile Technology, Yaba College of Technology-Nigeria, International Journal of Emerging Technology and Advanced Engineering (IJETAE), Volume 3, Issue 11, November 2013) 664.

[12] Mr. Rajratna A. Bhalerao, Dr. R.J. Patil, "Transient and Mode Shape Analysis of Gravity Roller Conveyor for Weight Reduction" Department of Mechanical Engineering. International Journal of Innovative Science, Engineering & Technology(IJISET), Vol. 1 Issue 5, July 2014.

[13] Yogesh T. Padwal, S.M.Rajmane, "Weight Reduction Technique used for A Roller Conveyor"PG Sudent, Mechanical engineering Dept. Assistant Professor, Mechanical engineering Dept.Bharat Ratna Indira Gandhi College of Engineering,Solapur,(M.S) India. International Journal of Latest Trends in Engineering and Technology (IJLTET), Vol. 3 Issue 1 September 2013.

[14] Chetan Kothalkar, T. Wankar and R.S. Wankar, " Analysis of the short distance gravity actuated oscillatory trolley conveyor" Scientific Officer, BRIT, BARC- Vashi complex, Vashi, Navi Mumbai -400705, India, CIRCOT, Matunga, Mumbai, India, Sinhagad college of engineering , Pune, India, 14th National Conference on Machines and Mechanism, NIT, Durgapur, India, December 17-18, 2009.

[15] Rick Garrity, "The Basics Of Conveyor Engineering Belt, Roller And Gravity" Manager, system engineering Interlake conveyors, INC 300HWY 44 East Shepherdsville, Kentucky 40165.

[16]Khurmi and Gupta "Theory of Machine" Edition Reprint 2007. Page no. 106-107.

[17]Khurmi and Gupta "Machine Design" Edition 2005. Page no. 261- 280 and 558-570.

[18] Design of machine Elements: - Prof. V. B. Bhandari, Tata Mc .Grew Hill Publishing Co. New Delhi.

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