Prof. Dipali Bhoyar, et. al. International Journal of Engineering Research and Applications
www.ijera.com
ISSN: 2248-9622, Vol. 12, Issue 5, (Series-II) May 2022, pp. 01-04

RESEARCH ARTICLE OPEN ACCESS

Design and Fabrication of pneumatic divertor for Rejected items

"Prof. Dipali Bhoyar" "Pranav Amrutkar, Tushar Ambulkar,Vishal Kelapure"
"Department Of Mechanical Engineering'.

ABSTRACT:
Present world is very much competitive world. Up growing technology is very much responsible in this case. The nation which have more updated technology, it dominates the world. To survive in the competition technology is very much important. In-dustry has very much influence on economy for a nation. Where there is industry, there must be production of some products. Technological improvement is very much necessary to industry for better product. Automation is very necessary for industry.
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 word

Keywords: ***Conveyor,IR Sensor,Roller,Pneumatic***

Date of Submission: 04-05-2022 Date of Acceptance: 18-05-2022

I. INTRODUCTION:

A small item pneumatic diverter for high speed diversion of articles, such as rejected item i.e. unfinished or oversize or undersize product, from a moving conveyor in a product handling system. The pneumatic diverter is particularly suited for diversion of small, relatively fragile articles after they have been optically scanned for size, weight, quality or rejected characteristics. The diverter has a pusher connected to a pneumatic actuator controlled compressed air dc valve that is connected to a source of compressed air. Aluminum Frame Conveyors: Many models are constructed of an assembled extruded aluminum frame which is very strong yet light weight. The smooth, continuous surface of a conveyor belt is ideal for many product handling applications. Cleated conveyors are commonly used to control product on a horizontal or inclined conveyor. The key attributes for cleated conveyors are the accuracy of the cleat spacing and durability of the cleat in the application. Dorner has developed conveying systems with all industrial and sanitary conveyor types. From small one-conveyor systems to large multi-conveyor systems, that integrates into other line equipment. Dorner offers modular plastic belt curve conveyors. The 5200 and 7400 Series conveyors can be used to create a product turn or a mainline conveying system in almost any configuration. Use the 5200 when aluminum frame conveyors meet the application needs and use the 7400 Series when sanitation or stainless steel requirements are needed by the application. Dorner understands the concerns and challenges in the food handling industry. Whether your food needs are in Bakery, Confectionery, RTE, Meat, Poultry, Seafood or Dairy the AquaPruf 7400 conveying system can be modified to meet your needs.

II. LITERATURE SURVEY:

Literature survey and review has been carried out based on the reference gathered, The small item pneumatic diverter for product handling

systems of the present invention solves the problems identified above. That is to say, the present invention discloses a pneumatic diverter particularly configured to rapidly and accurately sort small, relatively delicate products into selected categories according to specified criteria for those categories. The small item pneumatic diverter of the present invention is particularly suited for high speed processing of a stream of product units, such as cherries and the like, in an electronically controlled product handling system. In addition, the pneumatic diverter of the present invention reduces the number of parts necessary to divert small items from a conveyor system, which reduces the likelihood of mechanical problems and cost of manufacturing such systems and improves the reliability of the system and its to operate at higher conveyor speeds. In one aspect of the present invention, the small item pneumatic diverter is configured for use for high speed diversion of articles from a moving conveyor in a product handling system having a source of compressed air and a computer system. The diverter has an air valve in pneumatic communication with the source of compressed air and in operative communication with the computer system and a nozzle in pneumatic communication with the air valve. The nozzle has a nozzle body with a first end and an opposing second end. The first end of the nozzle body is connected to the air valve and the second end has a plurality of spaced apart discharge ports. The nozzle body is configured with an internal channel to allow compressed air to flow from the air valve to the plurality of discharge ports. Each of the plurality of discharge ports are in spaced apart relationship with each other and in a vertical relationship relative to the articles on the moving conveyor. Typically, the nozzle body will have a connector for connecting the nozzle to the air valve. In the preferred embodiment, the plurality of discharge ports includes an upper discharge port, a lower discharge port and one or more middle discharge ports disposed between the upper and lower discharge ports. Also in the preferred embodiment, for small articles, the upper discharge port is configured to discharge compressed air across the top of the article and the discharge ports are configured to discharge a plurality of horizontal air streams toward the article.

Problem definition:

Materials handling involves the movement, storage, control, and protection of materials during their manufacturing, distribution, consumption, and disposal . There are different material handling systems and equipment in industrial plants, which use conveyor system. It moves objects from the source to the terminal instead of moving objects with people due to its ability of continuity in the operation speed and consistency of objects in movement. Material handling systems ranges from simple pallet rack, shelving projects to complex overhead conveyor systems, automated storage, and retrieval systems. Material handling also consists of sorting and picking . In recent times, various sorting systems have been developed. The applications of sorting varies from agricultural products, consumer manufactured products, books, etc. Constantin and Michael in 2002 reported that every sorting methodology can be classified based on the specification of two issues

- The form of the criteria aggregation model which is developed for sorting purposes.
- The methodology employed to define the parameters of the sorting model . Few researches were also based on automatic sorting, manual sorting and online sorting methods. For example, few researchers proposed sorting system that can organize different material.

III. OBJECTIVES:

The objectives of the Pneumatic Divertor project are the following:

- Implementation of the pneumatic technology.
- Modified the existing mechanisms.
- To make use of pneumatic system were working fluid is readily available.
- To prepare and efficient and cost effective system.

Description of the proposed work
Methodology:

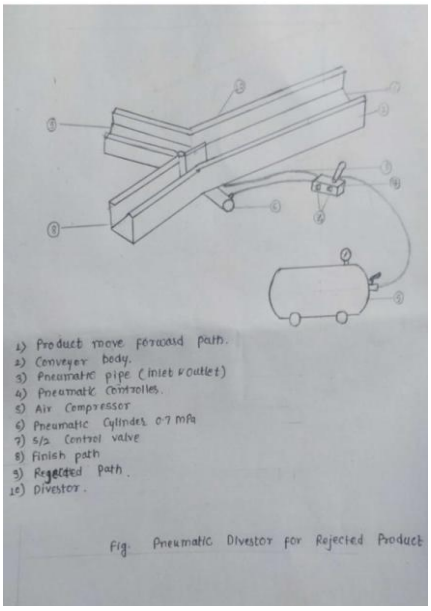

Fig: Flow Chart

Design Calculation:
F = p A
F= p π d2/4 (1)
where, F = force exerted (N)
p = gauge pressure (N/m2, Pa)
A = full bore area (m2)
d = full bore piston diameter (m)
F = p π (d12 - d22) / 4 (2) where d1 = full bore piston diameter (m) d2 = piston rod diameter (m) Pressure of the cylinder = 200kpa Diameter of the cylinder = 25mm Diameter of the piston rod = 10mm
F = p π d2 / 4
= [(2*105)* π * (0.025)2]/ 4 F = 98 N
Collar diameter=8cmF =
p π (d12 - d22) / 4 = (2*105) π [(0.025)2 - (0.01)2] / 4 F = 82 N
By standardizing, length of the piston rod = 230 mm = 0.23m

Components of machine :

1.AIR RECEIVER: Receivers provide constant air pressure in a pneumatic system, regardless of verying or fluctuating consumption. This enables briefly occurring consumption peaks to be balanced out, which cannot be made up by the compressor.

Fig. AIR RECEIVER

2.COMPRESSED AIR FILTER: The compressed air passes through the filter from left to right and is fed through a baffle plate in the filter bowl. The effect of the battle plate is that the air is caused to rotate, and the heavier dust particles and water droplets are spun by centrifugal force against the inner wall of the filter bowl.

Fig. COMPRESSED AIR FILTER

3.PNEUMATIC ACTUATORS: An actuator is an output device for the conversion of supply energy into useful work. The output signal is controlled by the system, and the actuator responds to the control signals via the final control element. Other type of output device are used to indicate the status of control system or actuator.

Fig. PNEUMATIC ACTUATORS

4.PNEUMATIC VALVE: Pneumatic control systems consist of signal components, control components and a working part. The signal and control components influence the operating sequence of the working element and are termed valves.

Fig. PNEUMATIC VALVE

5.FLOW CONTROL VALVES: Flow control valves (Throttle valves) influence the volumetric of compressed air, in both directions.

Fig.FLOW CONTROL VALVES

6.HOUISE AND TUBING: Beyond the compressed air distribution system, which is composed of rigid main pipelines, feeder lines and associated fittings and accessories, a means must be provided for conducting clean, dry and lubricated compressed air to tooling and equipment. Air hose tubing are used for this purpose.

Fig.HOUISE AND TUBING

5.4 Working Principle:

Easiest construction shown in the above 3D figure according to design requirement there is one conveyor shown in figure slide the finish or rejected item from one place to another by conveyor belt, in line undersize or oversize items coming from the conveyor check the quality control department and mark them by chalk ok or rejecter, operator reed or check the rejected item by naked eyes, as soon as oversize item coming in front of pneumatically

operated pusher, operator diverted it in rejected path way whereas finish object goes towards finish pathway, mounted actuator work on the command of pneumatic valves through the operator manual handling.From the observation of the pneumatic circuit , In let compressor air line pipe given to inlet of manual operated 5\2 pneumatic valve ,valve has two position , One is forward and another is for reverse operation,The two out let of valves connected to the two port of actuator .

Advantages:
1. Air is available everywhere
2. Can be stored easily
3. Clean and non–pollutant
4. Transportable over long distances
5. High-speed operation
6. No return lines
7. Relatively low cost to produce
8. Largely insensitive to temperature
9. Technology can be easily learned

Disadvantages:
1. Compressed air needs good preparation. Dirt, humidity may not be present.
2. It is not possible to achieve uniform and constant piston speed with compressed air.

IV. CONCLUSION:

Not resistant to fluctuating load very high speed possible operating pressure is minimum generally 6 bar uses only air. Air supply is necessary very low operating cost stroke control is easy but fluctuation unavoidable simple maintenance no problem in system overall cost is low weight to pressure ratio is large cylinder cushioning is not needed.

REFERENCES:

[1]. **1.**S. M. Shinde and R.B. Patil ,Optimization Technique Used for the Roller Conveyor System for Weight Reduction,"International Journal of Engineering Research & Technology (IJERT), vol. 1, no.5,2012.

[2]. Aniket A Jagtap, Shubham D Vaidya, Akash R Samrutwar, Rahul G Kamadi and Nikhil V Bhende, "Design of Material Handling Equipment: Belt Conveyor System for Crushed Biomass Wood Using V Merge Conveying System," International Journal of Mechanical Engi-

[3]. neering and Robotics Research, vol.4, no.2,2015.

[4]. Vanamane, S. S., Mane, P. A. and Inamder, K. H., "Design and its Verification of Belt Conveyor System Used for Mould Using Belt Comp Software," International Journal of Applied Research in Mechanical Engineering,vol. 1, no.1, pp. 48-52 ,2011.

[5]. I. A. Daniyan, A. O. Adeodu and O. M. Dada, "Design of a Material Handling Equipment: Belt Conveyor System for Crushed Limestone Using 3 roll Idlers," Journal of Advancement in Engineering and Technology, vol.1, no.1,2014.

[6]. Kunhimohammed C.K, Muhammed saifudeen K.K, Sahna S, Gokul M.S, "Automatic Color Sorting Machine Using TCS230 Colour Sensor And PIC Microcontroller", International Journal of Research and Innovation in Science and Technology, vol.2, 2015.Belt Conveyor System of Sugar Industry for Weight Reduction," Journal of Emerging Technologies and Innovative Research (JETIR), vol.2, no.5,2015.