

**IJRAME**

ISSN (ONLINE): 2321-3051

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING

DESIGN AND FABRICATION OF MATERIAL INSPECTION CONVEYER

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Abstract

The main aim of this project is to optimize the measuring height of work piece. Normally the plug gauges are used to measure the components. Instead of using manual inspection, automatic system by means of pneumatic comparators is used. The manual inspection is not so efficient so some improvement is needed in this measuring device. In this device the dimensions are calculated by using the comparator setup. The components are moved from one place to another with the help of Geneva conveyor. It is necessary to minimize the workers involved in it. We have designed a conveyor with Geneva drive which is useful in industries. So, here a conveyor model which is used for material transformation from one place to another is implemented. The size of the specimen is determined by the dimensions.

Keywords: Materials; Handling systems; Conveyor; Fabrication.

1. Introduction

1.1 MATERIAL HANDLING SYSTEM

The different Material Handling System are includes Bag Stackers, Truck Loaders, Inclined Belt Conveyors & Flat Top Conveyors. All these material handling products are planned and made following set industry strategies and parameters, confirming its safe operations and reliable performance for a longer period of time.

1.1.1 Bag Stacker

Tyco bag stackers are most useful for assembling 50 kg soya (seed or doc), grains, and sugar bags each jute of hope. With a top height of 15 feet it reduces the time and manpower significantly and become an essential part of storing movements. Easy maneuverability, short radius for turning and equipped by 2 hp hydraulic power pack, imported control panel, belt and various extra user friendly features adds up its efficiency proportion.

1.1.2. Truck Loader

Its single design for loading and unloading of 50 kg bags both jute and hope, makes it a favored in Soya grain, sugar industries. Having a minimum feeding height of 300 mm and a maximum 3 Meter height makes it very competent for loading to and unloading from the Trucks. Complete conveyor is mounted on an easily navigable trolley. A 2 HP Hydraulic Power Pack takes care of the raising and lowering. Imported German makes control Panel with IP 65 part and Variable Frequency Drive of reputed make ensure efficiency

1.1.3. Inclined belt conveyor

An actual valuable material handling system for moving Material from ground level to upper level, Each conveyor is planned according to their load carrying capacity Modular and light in weight with imported belt for proper grip to avoid slide down of material. Degree of Feeding varies from 1° to 45° contingent on the condition of the customer and material characteristics.

1.1.4. Flat Top Belt Conveyor

The skill in offering Flat Top Belt Conveyor is modular in design and has improved characteristics. Logistics need of handling 50 Kg scrap, soya, and DOC and sugar bags is conveniently met by these conveyors as these possess tailor-made features. Also, this range is found suitable for catering to warehousing related needs, wherein after accountability automatic considering and shooting activities, bags need to be lifted, diverted, raised or lowered for collecting in the storage areas and loading in trucks.

1.1.5. Conveyor

Modular design and modified topographies and presentation makes it a top most favorite by customers who wants to handle the logistics (50 Kg Bags of grain, Soya, DOC, Sugar etc) in the warehouse where after automatic weighing and catching, bags are lifted, diverted, raised, lowered for either loading in trucks or for loading in the storage areas.

1.2 RACK AND PINION

A rack and pinion is a pair of gears which change rotating wave into linear motion. The circular pinion involves teeth on a flat bar - the rack. Rotating motion applied to the pinion will source the rack to move to the side, up to the limit of its travel. The pinion is in mesh with a rack. The circular motion of the pinion is moved into the linear rack drive.



1.3 U-SLOT SENSOR

The slot sensors are U-shaped and the lively face is located between the two arms. The sensor is actuated when an thing documents the slot. Slot sensors detect crosswise imminent targets constantly, nevertheless of their coldness to the lively face. The ultra-small PM arrangement of u-shaped photoelectric sensors delivers a extensive range of 29 different mockups to suit any of your request needs. With the business's smallest size, the PM series plays a key role in the shrinking of your apparatus. All representations are ready with two outputs, one for Light-ON and the other for Dark-ON sensing. This increases the versatility of the sensor for use in present entitlements. The series is also obtainable in a connector type to maximize ease of fitting and allow for wire fallback if the cable is detached. The PM series obeys to the European EMC Instruction and conveys UL Recognition.

With opposite mode sensing pairs in U-shaped coverings Banner SL10 & SL30 Series Slot Sensors are ideal for sensing of color symbols on clear flick.

1.4 PROXIMITY SENSOR

A Proximity sensor container detect substances disadvantaged of physical communication. A proximity sensor frequently crops an electromagnetic arena or sunbeam and look for changes in the field. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor boards demand different sensors. For example, a capacitive or photoelectric sensor power be fit for a plastic target, an inductive closeness sensor requires a metal panel.

In capacitive proximity sensors, the detected thing changes the dielectric never-ending between two plates. A proximity sensor consumes a variety, which is regularly declaimed relative to water. As changes in capacitance take a comparatively long time to detect, the higher switching range of a proximity sensor is about 50 Hz. The proximity sensor often generates in bulk-handling machines, level detectors, and set detection. One benefit of capacitive proximity sensors is that they are open by dust or opaque ampules, allowing them to change optical devices.

Training the output of a proximity sensor has unceasingly been problematic. Proximity sensor originators must challenge linearity, hysteresis, excitation voltage variability, and power offset.

A proximity sensor that events present flow between the sensing electrode and the target delivers data in suitable engineering units. Typically, one side of the voltage source or oscillator connects to the sensing conductor.

2. WORKING METHODOLOGY

2.1 WORKING PRINCIPLE

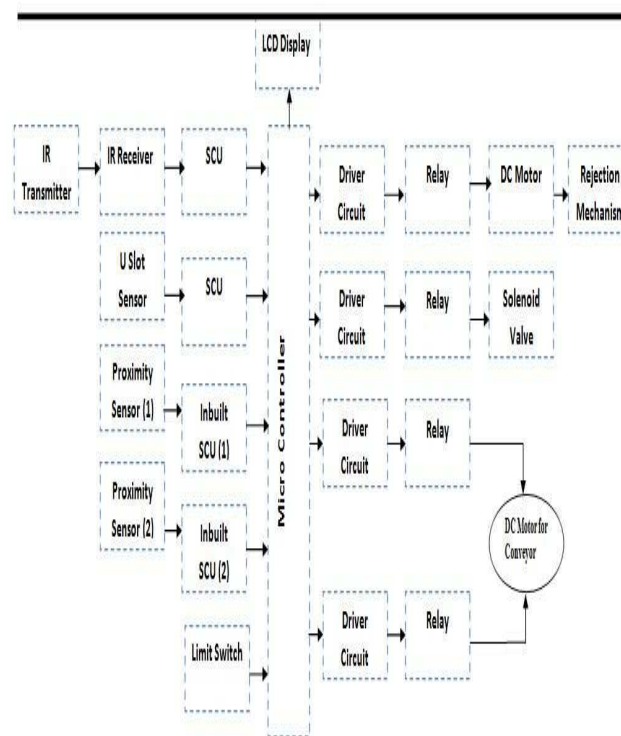
The project consists of pneumatic cylinder, rack and pinion, limit switch, u slot sensor, solenoid valve, Geneva, proximity sensor etc. Two rollers are mounted giving to the required coldness the belt is mounted on the rollers on which the materials are placed. The rollers shaft is coupled with the Geneva drive. The Machine Layout and the Micro Controller Circuit was shown in Figure 4.1 and 4.2. The Geneva drives shaft is joined with the motor shaft hence when power is supplied to the motor rollers rotate with a certain time delay according to the Geneva drive and the belt moves along the rollers. Thus material handling is carried out. With help of the Geneva drive the time delay can be attained.

The proximity sensor is used to total the rotation of the Geneva and it will stop after particular rotation. Here we are using the pneumatic cylinder for up and down movement, and the rack and pinion plan is fixed in the

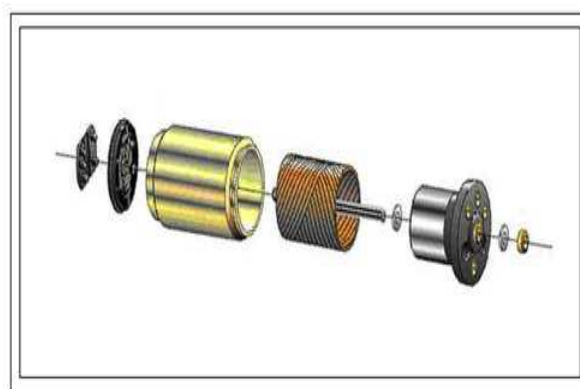
pneumatic cylinder. The whole setup is mounted on the base frame. The pneumatic roll is working with the help of supply of air from the compressor. The air is supplied to push the piston in up and down course. As the pneumatic cylinder piston is fixed to the top frame. When the piston moves down the rack also moves down only if a rotary signal to the pinion wheel. In the rack the limit switch is attached to limit the movement of the rack. The pinion wheel is mounted in the shaft with u-slot sensor. A u-slot sensor is kept at the end of the frame so that the rotation can be calculated. By this the dimension of the work piece can be strong-minded.

The IR transmitter and IR receiver is fixed in the conveyor model. When the job symbols over the transmitter and receiver signal, it measures the dimensions by using the pulse differences and sends the signal to the controller unit. If any dimension variation is found in the job means the rejection mechanism is used to reject the job absent from the conveyor. The proximity sensor is second hand to stop every revolution of the rejection mechanism motor.

2.2 BLOCK DIAGRAM



2.3 CALCAUTION DC MOTOR



Speed (N) = 30 rpm

Voltage (V) = 12 volt

Watts (W) = 18 watt

Electrical (electric) power equation

Power (P) = $I \times V$

(I) = W/V

Where, V = 12,

W = 18,

(I) = $18/12,$

= 1.5 A,

TORQUE OF THE MOTOR

Power = $[(2 \times 3.14 \times N) / (60)] \times T$

Torque = $(P \times 60) / (2 \times 3.14 \times N)$

Torque = $(18 \times 60) / (2 \times 3.14 \times 30)$

Torque = 5.72 Nm

Torque = 5.72×10^3 N mm

The shaft is made of Mild Steel and its allowable shear stress = 42MPa

Torque = $3.14 \times fs \times d^3 / 16$

5.72×10^3 = $3.14 \times 42 \times d^3 / 16$

D = 8.85 mm

The nearest standard size is D = 9 mm.

3. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. Smoother and noiseless operation by the medium of "MATERIAL INSPECTION AND DIMENSIONING CONVEYOR".

This project "MATERIAL INSPECTION AND DIMENSIONING CONVEYOR" is designed with the hope that it is very much economical and help full to many industries and workshops.

This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

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