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CONVEYOR BELT ALIGNMENT SYSTEM USING SCREW ROD AND SENSOR

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ABSTRACT

This is the new innovative concept mainly used for industries. It is simple in construction and the working process is easy. In industries, it is very necessary to move the components from one area to the other in a regular basis. It is necessary to minimize the workers involved in it. We have designed a conveyor with screw rod set up which is useful to avoid slippage of conveyor belt. So, here we have made a conveyor model which is used for material transformation from one place to another. Main components used in this project are motor, belt, screw rod and limit switch.

1.INTRODUCTION

A belt conveyor consists of two or more pulleys, with a continuous loop of material - the conveyor belt - that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler. There are two main industrial classes of belt conveyors; those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport industrial and agricultural materials, such as grain, coal, ores, etc. generally in outdoor locations. Generally companies providing general material handling type belt conveyors do not provide the conveyors for bulk material handling. In addition there are a number of commercial applications of belt conveyors such as those in grocery stores.The belt consists of one or more layers of material they can be made out of rubber. Many belts in general material handling have two layers. An under layer of material to provide linear strength and shape called a carcass and an over layer called the cover. The carcass is often a cotton or plastic web or mesh. The cover is often various rubber or plastic compounds specified by use of the belt. Covers can be made from more exotic materials for unusual applications such as silicone for heat or gum rubber when traction is essential. Material flowing over the belt may be weighed in transit using a beltweigher. Belts with regularly spaced partitions, known as elevator belts, are used for transporting loose materials up steep inclines. Belt Conveyors are used in self-unloading bulk freighters and in live bottom trucks. Conveyor technology is also used in

conveyor transport such as moving sidewalks or escalators, as well as on many manufacturing assembly lines. Stores often have conveyor belts at the check-out counter to move shopping items. Ski areas also use conveyor belts to transport skiers up the hill. A wide variety of related conveying machines are available, different as regards principle of operation, means and direction of conveyance, including screw conveyors, vibrating conveyors, pneumatic conveyors, the moving floor system, which uses reciprocating slats to move cargo, and roller conveyor system, which uses a series of powered rollers to convey boxes or pallets.

1.2 DESCRIPTION OF EQUIPMENTS

1.2.1 Limit Switch

A mechanical limit switch interlocks a mechanical motion or position with an electrical circuit. A good starting point for limit-switch selection is contact arrangement. The most common limit switch is the single-pole contact block with one NO and one NC set of contacts; however, limit switches are available with up to four poles.Limit switches also are available with time-delayed contact transfer. This type is useful in detecting jams that cause the limit switch to remain actuated beyond a predetermined time interval. Other limit switch contact arrangements include neutral-position and two-step. Limit switches feature a neutral-position or center-off type transfers one set of contacts with movement of the lever in one direction. Lever movement in the opposite direction transfers the other set of contacts. Limit switches with a two-step arrangement, a small movement of the lever transfers one set of contacts, and further lever movement in the same direction transfers the other set of contacts.

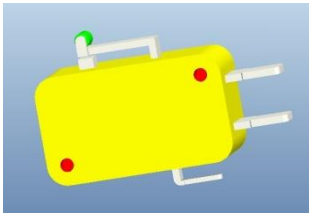

Figure.1.1 Limit Switch

Maintained-contact limit switches require a second definite reset motion. These limit switches are primarily used with reciprocating actuators, or where position memory or manual reset is required. Spring-return limit switches automatically reset when actuating force is removed. A centrifugal limit switch is actuated by speed only. Simple types of centrifugal limit switches consist of speed-sensing units that mount directly on a rotating shaft and a stationary-contact switch assembly. The basic control element is a conical-spring steel disc that has centrifugal weights fastened to the outer edge of its circular base. Fingers on the spring are attached to an insulating spool that rides free of the shaft and actuates the movable switch contact. As the rotating sensing unit reaches switching speed, the centrifugal force of the calibrated weights overcomes spring force, resulting in an instantaneous axial displacement of the spring and the contact-actuating spool. The contacts switch at one speed as speed increases from zero to operating speed, and at a lower speed as rotation slows from operating speed toward zero. The spring decreasingly opposes centrifugal force as rotational speed increases from standstill until the snap-over point is reached. Then, spring force adds to centrifugal force to axially snap the spool and actuate the contacts. As rotational

speed decreases from operating speed, spring force overcomes the centrifugal force of the weights at a lower speed where snapback begins.

1.2.2 ROLLER

It is a cylinder made out of mild steel. It has a length of 85mm and outer diameter is 67mm and inner diameter of 8mm.

Figure.1.2 Roller

1.2.3 BELT

Flat belts were used early in line shafting to transmit power in factories. It is a simple system of power transmission that was well suited to its day. It delivered high power for high speeds (500 hp for 10,000 ft/min), in cases of wide belts and large pulleys. These drives are bulky, requiring high tension leading to high loads, so vee belts have mainly replaced the flat-belts (except when high speed is needed over power. The Industrial Revolution soon demanded more from the system, and flat belt pulleys need to be carefully aligned to prevent the belt from slipping off. Because flat belts tend to slip towards the higher side of the pulley, pulleys were made with a slightly convex or "crowned" surface (rather than flat) to keep the belts centered. The flat belt also tends to slip on the pulley face when heavy loads are applied. Many proprietary dressings were available that could be applied to the belts to increase friction, and so power transmission.

Figure.1.3 Belt

Grip was better if the belt was assembled with the hair (i.e. outer) side of the leather against the pulley although belts were also often given a half-twist before joining the ends. So that wear was evenly distributed on both sides of the belt. Belts were joined by lacing the ends together with leather thronging or later by patent steel comb fasteners. A good modern use for a flat belt is with smaller pulleys and large central distances. They can connect inside and outside pulleys, and can come in both endless and jointed construction.

1.2.4 SUPPORTING PLATE

The plate is made up of m.s plate which is placing below the belt. It is for to transmit the object to straight bath. It does not affect the belt to be of rest.

1.2.5 ALARM

An alarm or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

Figure.1.4 Beeper

Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

1.2.6 NUT & SCREW ROD

A nut is a type of fastener with a threaded hole. Nuts are almost always used opposite a mating bolt to fasten a stack of parts together. The two partners are kept together by a combination of their threads' friction, a slight stretch of the bolt, and compression of the parts. In applications where vibration or rotation may work a nut loose, various locking mechanisms may be employed: Adhesives, safety pins or lock wire, nylon inserts, or slightly oval-shaped threads. The most common shape is hexagonal, for similar reasons as the bolt head - 6 sides give a good granularity of angles for a tool to approach from (good in tight spots), but more (and smaller) corners would be vulnerable to being rounded off. Other specialized shapes exist for certain needs, such as wing nuts for finger adjustment and captive nuts for inaccessible areas.Nuts are graded with strength ratings compatible with their respective bolts; for example, an ISO property class 10 nut will be able to support the bolt proof strength load of an ISO property class 10.9 bolt without stripping. Likewise, an SAE class 5 nut can support the proof load of an SAE class 5 bolt, and so on. A wide variety of nuts exists, from household hardware versions to specialized industry-specific designs that are engineered to meet various technical standards.

1.2.7 CONTROL UNIT

In this the control unit is used for control the whole assembly. It is an electronic device; the program of the unit is donning by using embedded lab.

1.2.8 Microcontroller

A microcontroller is a complete microprocessor system built on a single IC. Microcontrollers were developed to meet a need for microprocessors to be put into low cost products. Building a complete microprocessor system on a single chip substantially reduces the cost of building simple products, which use the microprocessor's power to implement their function, because the microprocessor is a natural way to implement many products. This means the idea of using a microprocessor for low cost products comes up often. But the typical 8-bit microprocessor based system, such as one using a Z80 and 8085 is expensive. Both 8085 and Z80 system need some additional circuits to make a microprocessor system. Each part carries costs of money. Even though a product design may requires only very simple system, the parts needed to make this system as a low cost product.To solve this problem microprocessor system is implemented with a single chip microcontroller. This could be called microcomputer, as all the major parts are in the IC. Most frequently they are called microcontroller because they are used they are used to perform control functions.The microcontroller contains full implementation of a standard MICROPROCESSOR, ROM, RAM, I/0, CLOCK, TIMERS, and also SERIAL PORTS. Microcontroller also called "system on a chip" or "single chip microprocessor system" or "computer on a chip".A microcontroller is a Computer-On-A-Chip, or, if you prefer, a single-chip computer. Micro suggests that the device is small, and controller tells you that the device' might be used to control objects, processes, or events. Another term to describe a microcontroller is embedded controller, because the microcontroller and its support circuits are often built into, or embedded in, the devices they control.Today microcontrollers are very commonly used in wide variety of intelligent products. For example most personal computers keyboards and implemented with a microcontroller. It replaces Scanning, Debounce, Matrix Decoding, and Serial transmission circuits. Many low cost products, such as Toys, Electric Drills, Microwave Ovens, VCR and a host of other consumer and industrial products are based on microcontrollers.

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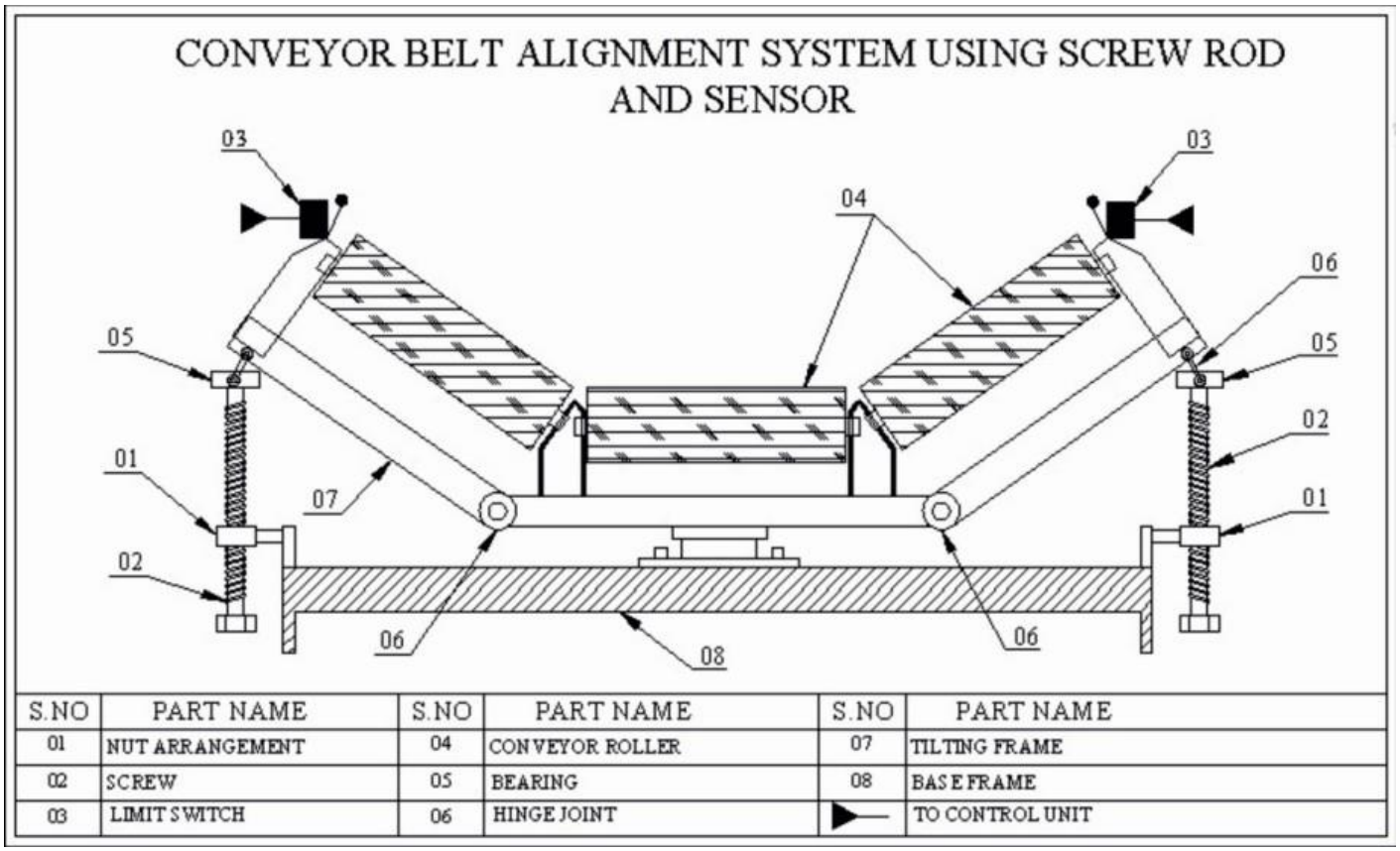
2. DESIGN AND ANALYSIS

2.1 DRAWING



S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME
01	NUT ARRANGEMENT	04	CONVEYOR ROLLER	07	TILTING FRAME
02	SCREW	05	BEARING	08	BASE FRAME
03	LIMIT SWITCH	06	HINGE JOINT		TO CONTROL UNIT

Figure.2.1 Block Diagram

WORKING PRINCIPLE

In this conveyor belt alignment system consists of screw set up with motor, conveyor belt and two limit switches. The both limit switch with roller set up are placed both side of the conveyor. While conveyor move fast , possible to slip from the rollers so that, to avoid slippage of conveyor , two screw set up with motor arrangement are mounted on frame to tile the conveyor belt one side or both side of the conveyor belt. Dislocation of the belt is detected by two small rollers with limit switch on both side control the screw setup

ANALYSIS RESULTS FOR TILTING ROD MILD STEEL (EXISTING)

TOTAL DEFORMATION

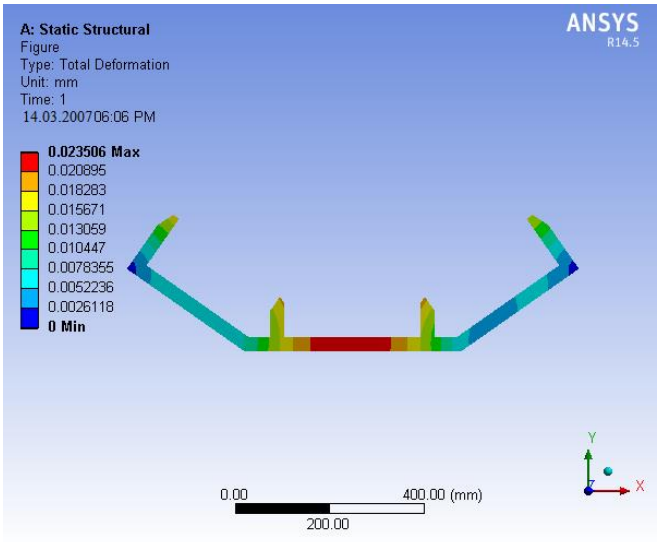


Figure.2.1 **Total Deformation- Mild Steel**

EQUIVALENT ELASTIC STRESS

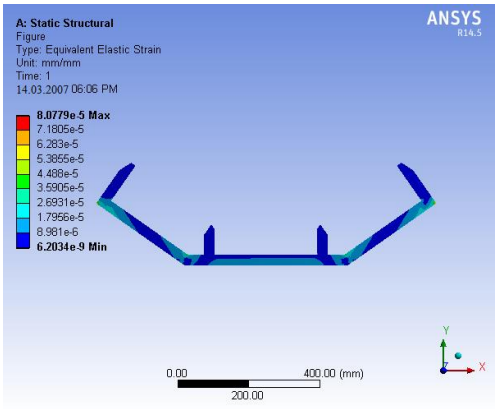


Figure.2.2 **Equivalent Elastic Stress -mild Steel**

EQUIVALENT STRESS

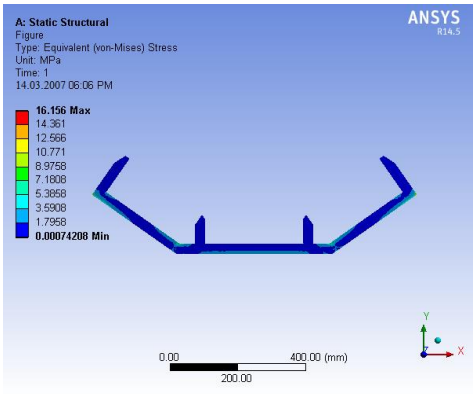


Figure.2.3 **Equivalent Stress- mild Steel**

STAINLES STEEL (OPTIMIZED)

TOTAL DEFORMATION

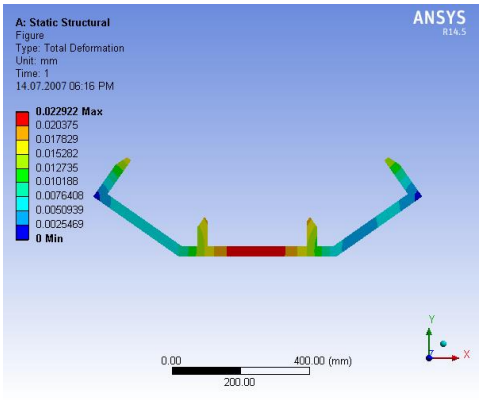


Figure.2.4 **Total Deformation-- Stainles Steel**

EQUIVALENT ELASTIC STRESS

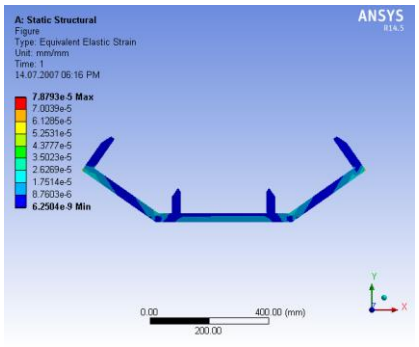
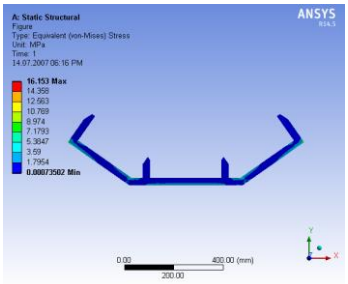


Figure.2.4 **Equivalent Elastic Stress- Stainles Steel**

EQUIVALENT STRESS



Material	Total deformation (mm)	Equivalent elastic strain (mm/mm)	Equivalent stress MPa
Mild steel	0.0235	8.07e-5	16.156
Stainless steel	0.0229	7.87e-5	16.153

Figure.2.5 **Equivalent Stress- Stainles Steel**

3.Result

From the analyzing results stainless steel has low deformation, stress and strain values compared to the existing mild steel material. So stainless steel can be used for tilting rod, because of its strength and non- corrosion characteristics.

4.conclusion

The project carried out by us made an impressing mark in the field of material handling industries. It is very useful for the workers for the job production. This project will reduce the cost involved in the concern. Project has been designed to perform the entire requirement task at the shortest time available.

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