



CONVEYOR BELT LIFTER FOR LATHE OPERATIONS



A PROJECT REPORT

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BONAFIDE CERTIFICATE

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We jointly declare that the project report on “**COVEYOR BELT LIFTER FOR LATHE OPERATION**” is the result of original work done by us and best of our knowledge, similar work has not been submitted to “**K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY**” for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfilment of the requirement of the award of Degree of **BACHELOR OF ENGINEERING**.

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ABSTRACT

To develop a mechanical system for taking loads from pallet box to chucks in lathe machine . This conveyor belt lifter machine helps the worker to take the work piece without much attention which helps the worker to concentrate on the work on lathe machine. It mainly helps for those who work for long hours in lathe machine without rest.

A conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. This project aims to the transfer of packages by the difference between the datum lines through the conveyor on the action of gravity force with belt for the movement of the packages.

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CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION

A material handling conveyor lets a product move on belt using the force of gravity to move the load. Mechanical conveyors are one of the simplest and affordable types of material handling systems. They work by allowing the product to roll along the upper surface. When mounted on a slight decline the parts begin moving across the belt. They are great for warehouses, production facilities, or distribution centers.

Conveyors are gravity or powered equipment commonly used for moving bulk or unit load continuously or intermittently, unidirectional from one point to another over fixed path, where the primary function is conveying of the material by the help of movement of some parts/components of the equipment. The equipment as a whole does not move. A roller conveyor supports unit type of load on a series of belt, mounted on bearings, resting at fixed spacings on two side frames which are fixed to stands or trestles placed on floor at certain intervals.

A belt conveyor essentially conveys unit loads with at least one rigid, near flat surface to touch and maintain stable equilibrium on the belt, like ingots, plates, rolled stock, pipes, logs, boxes, crates, moulding boxes etc. The spacing of belt depend on the size of the unit loads to be carried, such that the load is carried at least by two belt at any point of time. belt conveyors are classified into two groups according to the principle of conveying action. These are: 1. Unpowered or Idle belt Conveyor. 2. Powered or Live belt Conveyor. In an unpowered conveyor, the belt are not driven or powered from an external source. The loads roll over the series of belt either by manual push or push from an endless moving chain or rope fitted with pusher dogs, rods or clamps. Generally these conveyors operate at horizontal plane, but at times a gentle slope is given to these conveyors to aid motion of the loads. An inclination of 1.5% to 3% ensures that the load will roll by DC motor.

Such conveyors are termed “material handling conveyor”. In a powered conveyor, all or a selected number of belt are driven by one or a number of motors depending on the selected drive arrangement. The driven belt transmit motion to the loads by friction. The

powered conveyors may be installed at a slightly inclined position, up to 10° up or up to 17° down. The load can be moved in either directions by changing the direction of rotation of the belt, where these are called reversing conveyors.

Roller conveyors are used for conveying almost any unit load with rigid riding surface that can move on two or more belt. These are particularly used between machines, buildings, in warehousing as storage racks, docks, foundries, rolling mill plants, manufacturing, assembly and packaging industry. They are also used for storage between work stations and as segment of composite handling system. However, the limitations of belt conveyors are that they can be best used for objects with rigid flat surfaces, and for movement to relatively short distances. Needs side guards to retain the loads from falling off. Material handling conveyors have the risk of accelerating loads.

1.2 Types of Conveyors

1.2.1 Belt Conveyor System

1.2.2 Flexible Gravity Conveyors

1.2.3 Roller Conveyor System

1.2.4 Screw Conveyors

1.2.5 Trolley Conveyors

1.2.6 Reciprocating vertical conveyor

1.2.7 Vertical lift conveyor

1.2.8 Pneumatic conveyor

1.2.9 Vibrating conveyor

1.2.10 Bucket conveyor

1.2.1 Belt Conveyor System

A conveyor belt is the carrying medium of a belt conveyor system. A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium—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 pulley.

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 large volumes of resources and agricultural materials, such as grain, salt, coal, ore, sand, overburden and more.

1.2.2 Flexible Gravity Conveyor

The flexible gravity conveyor is basically working on a gravity force. It was flexible and useful for low weights packaged materials. They can be installed anywhere, and much safer than forklift or machine to move materials. They can transport light weight packaged materials.



Fig 1.1 Flexible Gravity Conveyor

1.2.3 Roller Conveyor

Roller Conveyor is a conveyor consisting of fixed-location roller over which materials are moved by gravity or propulsion. These conveyors are suitable for light applications up to 50 kg such as cardboard boxes and tote boxes.

A single shaft runs below the belt running the length of the conveyor. On the shaft are a series of spools, one spool for each roller. An elastic polyurethane o-ring belt runs from a spool on the powered shaft to each roller.



Fig 1.2 Roller Conveyor

1.2.4 Screw Conveyors

A screw conveyor or auger conveyor is a mechanism that uses a rotating helical screw blade usually within a tube, to move liquid or granular materials. They are used in many bulk handling industries. Screw conveyors in modern industry are often used horizontally or at a slight incline as an efficient way to move semi-solid materials, including food waste, wood chips, aggregates, cereal grains, animal feed, boiler ash, meat and bone meal, municipal solid waste, and many others. The first type of screw conveyor was the Archimedes' screw, used since ancient times to pump irrigation water.

They usually consist of a trough or tube containing either a spiral blade coiled around a shaft, driven at one end and held at the other, or a "shaftless spiral", driven at one end and free at the other.

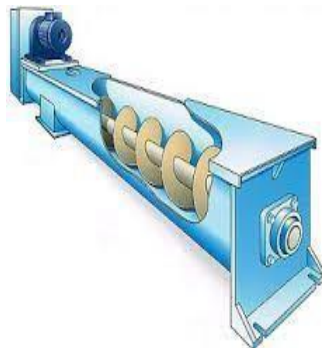


Fig 1.3 Screw Conveyors

1.2.5 Trolley Conveyors

Trolley Conveyor is a series of trolleys with loads suspended from them, supported by an overhead track and connected by an endless propelling medium such as chain or cable. Trolley conveyor chain is used to carry goods hung under ceiling. As being used three dimensionally, chain can run winding horizontally and vertically. Multi driving points will allow chain system extended to long distance.

Trolley conveyor is a continuously operating device for moving various, primarily packaged and piece, materials within a shop. It consists of a enclosed , suspended, single-rail track, moving trolleys (carriages) with cargo hangers (hooks, clamps, stands), a tension device, and a drive element such as a chain or, more rarely, a steel cable, which is secured to the trolleys and set in motion by one or several drive systems. It is shown in figure 1.2.5.



Fig 1.4 Trolley Conveyors

1.2.6 Reciprocating vertical conveyor

Vertical Reciprocating Conveyors (VRCs) are a cost-effective, safe, and easy way to move materials from one elevation to another. They are ideally suited for the safe and efficient movement of materials to a mezzanine, rack storage system with catwalks, or any new or existing upper floor level.

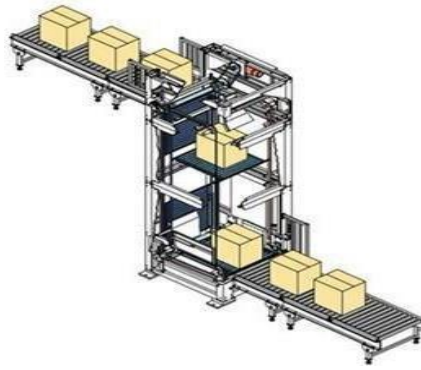


Fig 1.5 Reciprocating vertical conveyor

1.2.7 Vertical lift conveyor

A vertical conveyor is a machine which can be used to move products automatically from one level to another. In internal logistics, there are various ways for getting product flows up or down.



Fig 1.6 Vertical Lift Conveyor

1.2.8 Pneumatic conveyor

Every pneumatic system uses pipes or ducts called transportation lines that carry a mixture of materials and a stream of air. These materials are free flowing powdery materials like cement and fly ash. Products are moved through tubes by air pressure. Pneumatic conveyors are either carrier systems or dilute-phase

systems; carrier systems simply push items from one entry point to one exit point, such as the money-exchanging pneumatic tubes used at a bank drive-through window. Dilute-phase systems use push-pull pressure to guide materials through various entry and exit points. Air compressors or blowers can be used to generate the air flow. Three systems used to generate high-velocity air stream are:

- (1) Suction or vacuum systems, utilizing a vacuum created in the pipeline to draw the material with the surrounding air. The system operated at a low pressure, which is practically 0.4–0.5 atm below atmosphere, and is utilized mainly in conveying light free flowing materials.

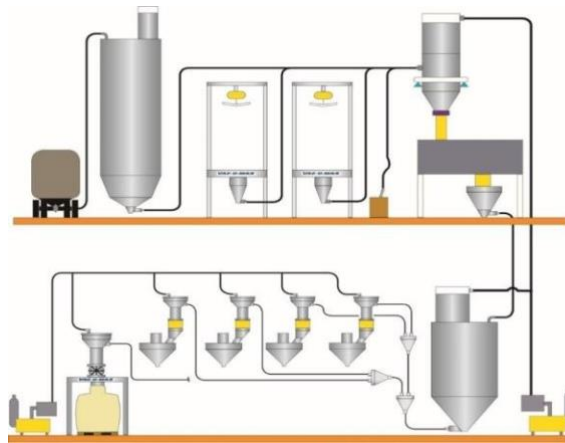


Fig 1.7 Pneumatic conveyor

- (2) Pressure-type systems, in which a positive pressure is used to push material from one point to the next. The system is ideal for conveying material from one loading point to a number of unloading points. It operates at a pressure of 6 atm and upwards.
- (3) Combination systems, in which a suction system is used to convey material from a number of loading points and a pressure system is employed to deliver it to a number of unloading points.

1.2.9 Vibrating conveyor

Vibrating conveyors are robust conveying equipment used for fine to coarse- grained bulk materials. Whether this be powdery materials, gravel or coarse scree. They are extremely durable provided that these materials are conveyed horizontally. The only limitation results from the suspension design.

High conveying rates are demonstrated particularly when compared directly to conveyor belts, which block with the same material pressure or wear out too quickly when used in the silo. However, vibrating conveyors are relatively impervious to congestion or conveyor channel blockages. They generally work freely again without intervention. It should be noted when planning the design that they work most efficiently in a horizontal or inclined direction.

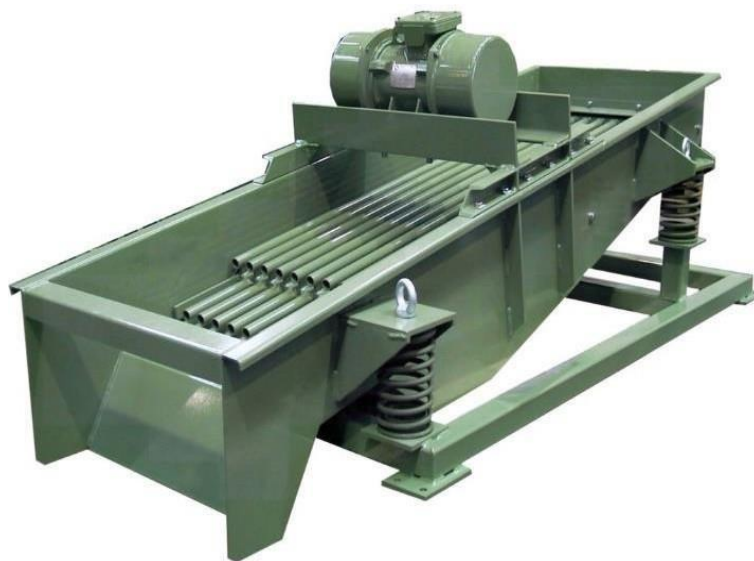


Fig 1.8 Vibrating conveyor

1.2.10 Bucket conveyor

A conveyor consisting of a continuous line of bucket attached by pivots to two endless roller chains running on tracks and driven by sprockets.



Fig 1.9 Bucket conveyor

CHAPTER 2

LITERATURE SURVEY

2.1 LITERATURE REVIEW

- [1] **Mr. Nasif Hassan Khan** Presented paper on “Fabrication of a Conveyor Belt with Object Sorting and Counting Facility” includes factors and basic component used in conveyor system. In this paper we studied about how to use factor and basic component in a conveyor system and avoid accident and defective parts by using control system. In this paper they include design of mechanical and electrical component and program related to control system.

- [2] As per **Mr. Akshay K. Naphade, Prof. Manish J. Deshmukh** who presented Paper on A Review of “Improved Automated Conveyor with Auto Separated System for Oil Packaging Industry”.in this case we identify the necessary to sensors and monitoring system for detects the defective products with help of electronic system. This proposed system gives the convenient approach of automatically detecting the weight of oil bottle on the conveyor system using a PLC for high reliability and fast operation without interruption.

- [3] **Mr. Abhijit Gaikwad, Prof. Shreekant Pawar** are presented paper on “Design and development of automated conveyor system and material handling” and they discussed about the design for belt conveyor system. In this review we study about Materials and products need to be transported from one manufacturing stage to another.

- [4] **Mr. Joshua Todd Fluke** are paper presented on “Implementing an Automated Sorting System” include the how to sorting product on conveyor system. We are discussed about this project was to create a simulated and theoretical automated process to sort product coming out of the distribution centre.

- [5] As discuss by **Vikas Gupta, Rajesh Bansal, Vineet Kumar Goel**, in “A review on material handling equipment and their selection for potential” Applications Transport material handling systems are used to move material for a short or long distance from one location to another like between workshops, between cities, to store, to railway, to ships. The major subcategories of transport material handling systems are given in Figure 1. In addition to manual system, conveyors (like flat belt, trolley), cranes (like gib, gantry), trucks (like light, heavy) and automatic guided vehicles (AGVs₁ a₂nd robots) can be used to shift the material.

2.2 Literature Summary

- ❖ Conveyors are durable and reliable components used in automated distribution and warehousing, as well as manufacturing and production facilities. In combination with computer-controlled pallet handling equipment this allows for more efficient retail, wholesale, and manufacturing distribution. It is considered a labor saving system that allows large volumes to move rapidly through a process, allowing companies to ship or receive higher volumes with smaller storage space and with less labor expense.
- ❖ Belt conveyors are generally fairly similar in construction consisting of a metal frame with belt at either end of a flat metal bed. The belt is looped around each of the belt and when one of the belt is powered (by an electrical motor) the belting slides across the solid metal frame bed, moving the product. In heavy use applications the beds which the belting is pulled over are replaced with belt. The belt allow weight to be conveyed as they reduce the amount of friction generated from the heavier loading on the belting.
- ❖ Belt conveyors can now be manufactured with curved sections which use tapered belt and curved belting to convey products around a corner. These conveyor systems are commonly used in postal sorting offices and airport baggage handling systems. A sandwich belt conveyor uses two conveyor belts, face-to-face, to firmly contain the item being carried, making steep incline and even vertical-lift runs achievable.
- ❖ Belt conveyors are the most commonly used powered conveyors because they are

the most versatile and the least expensive. Product is conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. These conveyors should use only the highest quality premium belting products, which reduces belt stretch and results in less maintenance for tension adjustments. Belt conveyors can be used to transport product in a straight line or through changes in elevation or direction. In certain applications they can also be used for static accumulation or cartons.

- ❖ Material Handling involves the movement of materials from one place to another for the purpose of processing or storing. According to American Material Handling society,' Material Handling is an art and science of involving the movement, packing and storing of subsystems in any form. Thus material handling function includes all types of movements vertical, horizontal or combination of both and of all types of material fluid, semi fluid and discrete items and of movements required for packing and storing. The material handling function is considered as one of the most important activities of the production function as out of total time spent by the materials inside the plant area, about 20% of the time is utilized for actual processing on them while remaining 80 % of the time is spent in moving from one place to another, waiting for processing or finding place in sub- stores. Moreover about 20 % of the total production cost is traceable as material handling cost.

CHAPTER 3

METHODOLOGY

3.1 Flow Chart

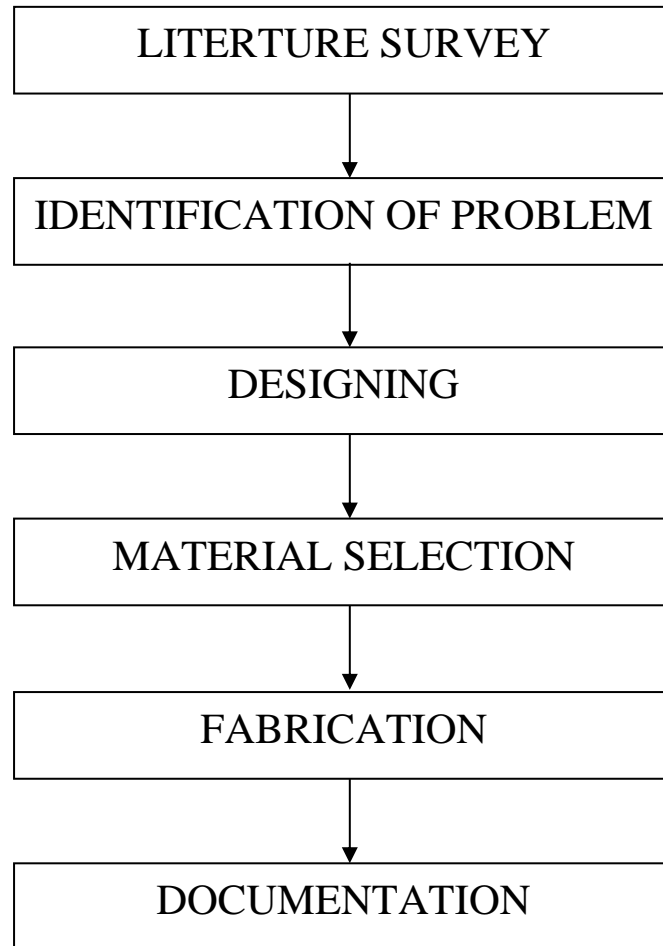


Fig 3.1 Methodology

3.2 PROBLEM IDENTIFICATION

Workers find difficulties in taking the work piece every time from the pallet box while doing this for long period of time they get distracted in work.

The cost, human labor, time, and most importantly energy was wasted in conventional process. During the project design stage for the transport of raw materials or finished products, this choice of the method is most favorable, cost effective solution for the volume of material moved; the plant and its maintenance; its flexibility for adaptation and its ability to carry a variety of loads and even be overloaded at times. More importantly a development team can easily monitor the design to be robust and accelerate the work.

3.3 PROJECT PLANNING

Our project is based on the handling of work piece used in lathe operations. It is a combination of mechanical and electrical logics including conveyor is controlled automatically by using dc motor. At first we thought about the design of this machine. Though we build a prototype we had to be careful about the design and dimension. After surveying on various industries we cleared our concept and designed our machine with proper dimension. To build this project we distributed our work in two parts which included the mechanical part. First we decided to build the mechanical part which included the belt conveyor. All the works had done in our departmental workshop. After completing the mechanical part we worked on the electrical part. For building this project completely necessary work had done on the workshop.

3.4 COMPONENT DETAILS

Mechanical load conveyor typically consist of a series of metal or plastic belt or wheels mounted on a slight incline or decline, allowing items to move freely along the conveyor's length. The force of gravity propels the items down the slope, requiring no external power source such as motors or electricity.

These conveyors are often used in applications where there is a need for manual or semi-automatic movement of items, such as in warehouses, distribution centers, manufacturing facilities, and shipping areas. They are commonly employed for tasks like sorting, assembly, packaging, and loading/unloading operations.

3.4.1 BELT

A moving belt that carries objects from one place to another, for example in a factory.

It is a flexible endless strip of fabric or linked plates driven by rollers and used to transport objects, especially in a factory.

Cylindrical belt are generally used which are made from ERW steel pipes with cast or fabricated end flanges to accommodate the antifriction bearings (usually ball bearings). The through axles are stationary and roller barrels can rotate freely. These belt are called idler belt. For conveying cylindrical objects (drums, pipes, round steel bars etc.), double tapered belt or wheel belt are used.

3.4.2 FRAME

Frame is that part of the conveyor on which the roller axles rest and are fixed to. The conveyor frame is fabricated from angle or channel sections. The roller axles are held in slots cut in the flanges of the frame. The axles are flat machined at the ends so that the axles do not rotate in the slots. Axial movement of the axles are prevented by using split pins or lock plates. For heavy belt, the axles may be fixed on the frame by clamps. Side guards may be provided along two edges of the frame to prevent movement of the loads beyond the roller span. Side guards are particularly necessary at the curved sections of a conveyor.

3.4.3 SCREW ROD

Screw rod, is a metal rod that is threaded throughout the entire length of the rod. It's typically made from carbon, zinc coated or stainless steel. The threading allows for bolts and other types of fixings to be fastened onto the rod to suit many different construction applications.

3.4.4 MILD STEEL

Mild steel also known as plain-carbon steel, is now the most common form of steel because its price is relatively low while it provides material properties that are acceptable for many applications. Low-carbon steel contains approximately 0.05- 0.15% carbon making it malleable and ductile. Mild steel has a relatively low tensile strength, but it is very cheap at cost.

3.4.5 DC MOTOR

A Direct Current (DC) motor is shown in Fig. 3.2 is a motor that turns energy from a direct current and turns this into mechanical energy. At the core of the windshield wiper system is a DC electric motor, typically found under the hood near the firewall that separates the engine from the passenger area. This motor generates a circular motion that is transformed by a linkage mechanism into a back-and-forth movement.



Fig 3.2 DC Motor

3.4.6 BOLTS AND NUTS

Bolts and nuts shown in Fig.3.3 are threaded lengths of steel rod with heads on one end. They are used with a nut at the other end and sometimes with a washer as well. Most of them have a hexagonal head (6-sided). Carriage bolts are used to fasten Mild steel strip parts where a smooth finish is required.



Fig 3.3 Bolts and Nuts

3.4.7 12 VOLT DC BATTERY

A DC battery or direct current battery shown in Fig. 3.4 is a type of energy storage device that provides electrical energy in direct current. The Exide Chloride Safe power 7AH 12V battery is a sealed lead-acid battery that is designed to provide backup power for a variety of applications.

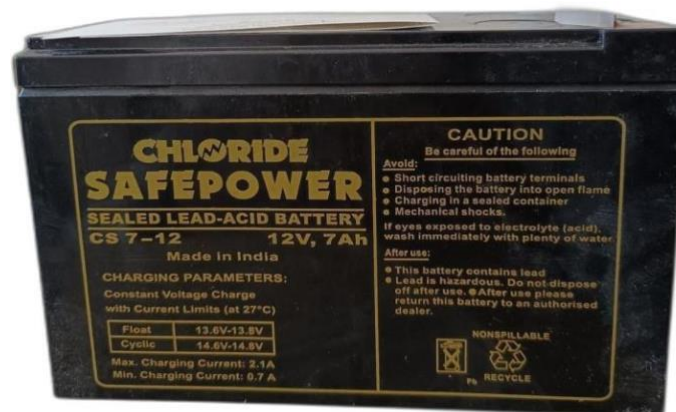


Fig 3.4 12 Volt DC Battery

3.4.8 DOOR HINGES

Hinges shown in Fig. 3.5 are the hardware used to attach a door to its frame, serving as the pivot point for opening and closing the door.



Fig 3.5 12 Door Hinges

CHAPTER 4

DESIGN CALCULATION AND MAJOR COMPONENT

4.1 DESIGN CALCULATION

4.1.1 MOTOR (Specifications)

speed = 45 rpm voltage=12v

Horse power = 0.11 hp

Working Torque = 8 Nm

Material = Mild steel

4.1.2 FRAME

Material = Mild steel

Area of the outer frame = $l \cdot b$ sq. units

$$= 457.2 \times 312.42 \text{ mm}^2$$

$$= 142838.42 \text{ mm}^2$$

Area of the inner frame = $l \cdot b$ sq. units

$$= 304.8 \times 152.4 \text{ mm}^2$$

$$= 46451.52 \text{ mm}^2$$

4.1.3 CONVEYOR BELT

Length = 292 mm

Breadth = 114 mm

Material = Flux cloth

4.2 ASSEMBLY DIAGRAM

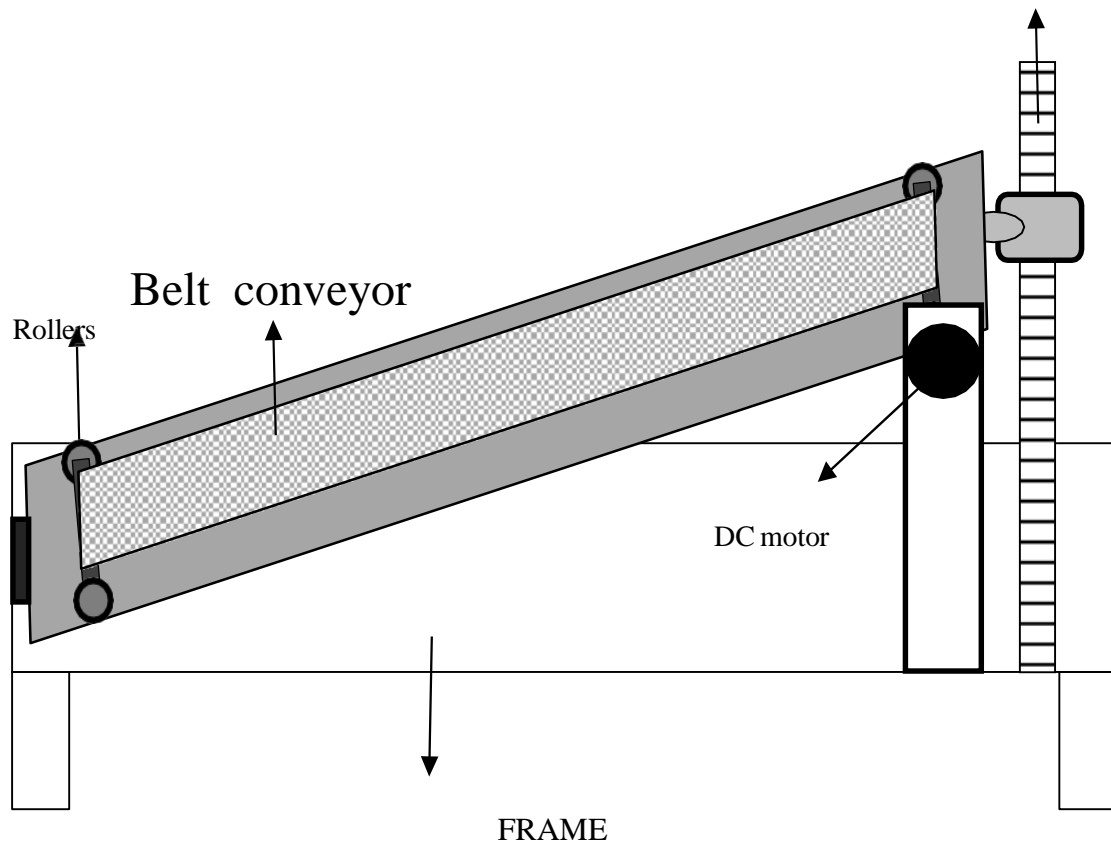


Fig 4.1 Assembly Diagram

CHAPTER 5

BILL OF MATERIALS

5.1 Cost Estimation

S. NO.	PARTICULARS	PRICE
01	Main Frame	1500
02	Conveyor Frame	250
03	Bush	100
04	Rollers, Conveyor Belt	450
05	DC Motor	520
06	Bolt and Nuts	120
07	Screw Rod	150
08	Couplings	240
09	Pat Lock	120
10	Miscellaneous	600
Total		4050

CHAPTER 6

CONCLUSION

The main purpose for building this machine is to automate the handling of work piece on lathe operations and its packaging. We are trying to build a prototype for expressing our motive on this project. Though we have some mistakes caused by human error but we believe that we can clear our concept by our work. The total process is controlled by a control system automatically.

We mainly focus on the movement work piece from ballot to chuck in lathe operation. The control system helps to package the right amount of material. It stops the machine for a certain time between two packaging process. So once it is set the requirement of skilled operator is also reduced as compared to a manual system.

Though this project have some limitations regarding the strength and built of the structure, it can be considered to be a small step forward, as far gravity conveyor are concerned. During the test run of this project, it was realized that it would not be a bad idea to consider this design for carrying heavy loads up the flexible conveyor.

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PHOTOGRAPHY



**Front view of Conveyor Belt Lifter
for Lathe Operation**



**Top view of Conveyor Belt Lifter for
Lathe Operation**



**Side view of Conveyor Belt Lifter for
Lathe Operation**