

360 Degree Rotated Gearbox Trolley

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Abstract: The rotating trolley with lead screw mechanism is a system through which can unload the trolley in congested area by rotating the trolley 360 degree about its own centre with the help of worm and worm wheel. A toggle jack is operated by turning a lead screw. An inherent advantage is that, if the tapered sides of the screw wear, the mating nut automatically comes into closer engagement, instead of allowing backlash to develop. The trolley can lift at any particular angle for the unloading of trolley with the help of lead screw and universal joint.

Keywords: Gearbox trolley, worm and worm wheel, lead screw and universal joint

❖ Introduction:

A toggle jack is operated by turning a lead screw. In this case of a jack, a small force applied in the horizontal plane is used to raise or lower large load [2]. A jackscrew's compressive force is obtained through the tension force applied by its lead screw.

The An Acme thread is most often used, as this thread is very strong and can resist the large loads imposed on most jackscrews while not being weakened by wear over many rotations. The rotating trolley with lead screw mechanism is a system through which we can unload the trolley in congested area by rotating the trolley 360 degree about its own centre with the help of worm and worm wheel. The trolley can lift at any particular angle for the unloading of trolley with the help of lead screw and universal joint. In the modern age the trolley lifting process is pressure system but here in this project the trolley lifting take place with the help of lead screw by rotating shaft connect with universal joint which provide the motion at any angle. The universal joint is connect with the lead screw. The trolley can lift at any particular angle for the unloading of trolley with the help of lead screw and universal joint. In the modern age the trolley lifting process is pressure system but here in this project the trolley lifting take place with the help of lead screw by rotating shaft connect with universal joint which provide the motion at any angle. The universal joint is connect with the lead screw.

❖ LITERATURE REVIEW:

Michael Kay [1], noted out the different ways of handling various materials. It involves "short-distance movement that usually takes place within the confines of a building

such as a plant or a warehouse and between a building and a transportation agency". It can be used to create "time and place utility" through the handling, storage, and control of material, as distinct from manufacturing (i.e., fabrication and assembly operations), which creates "form utility" by changing the shape, form, and makeup of material

Hemant and Niles [2], point out that trucks, tippers and dump trucks are used to transport loose material from one place to another place at construction site in mines or in dump yards to accomplish the actual site requirement.

Praveen Raj et al. [3], pointed out that in the modern world though there are many developments in the field of engineering. Development of lift simplifies the effort of carrying heavy loads over stairs, it is not possible to use lift in all places like schools, college's constructional areas.

❖ METHODOLOGY:

- To the formation of this project first of all we purchases the mechanical component like-Wheel, Worm Gear, universal joint, lead screw, bearing etc.
- Draw the rough sketch in creo parametric software for overview of project.
- Form the frame of trolley in workshop by metal sheet.
- Fit the frame on wheel axel.
- Assemble all components of trolley.

➤ Trolley lifting Mechanism

- The trolley lifting mechanism is adopted to lift the trolley to the required angle after turning it. This

mechanism mainly consists of a movable frame and a toggle jack. The trolley lifting mechanism is shown in Fig.1 below with components as of worm and worm gear, DC series motor, toggle jack, fixed frame, moving frame and trolley.

The fabrication of the trolley turning and lifting mechanism mainly consists of the following major components, they are:

- Trolley Body
- Fixed Frame
- Moving Frame
- Engine Frame
- Rotating Frame

❖ **DESIGN ANALYSIS AND WORKING PROCESS**

➤ **Worm & Worm Gear**

Where,

- D = Diameter of Gear
- d = Diameter of Lead Screw
- p = Pitch of Teeth

- 1-The gear material is cost iron.
- 2-The number of teeth on worm gear is 26 and the number of teeth on worm is 3.
- 3-The worm is a single point starting teeth.
- 4-The trolley is mounted on worm gear.

➤ **Lead Screw design -**

In lead screw selection process, we find out length of lead screw, material selection for screw and nut, outer or major diameter, minor diameter, pitch diameter, pitch, lead, type of thread. The lead screw nut is a part with an internal thread that mates with the lead screw's external thread, and provides some way to secure the nut to the machine and transmit the force produced by the rotation of the lead screw.

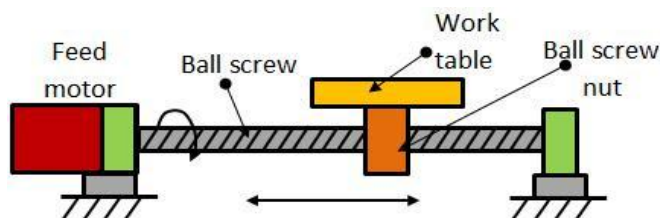


FIG.1 Mechanism of Trolley

➤ **WORKING OF THE PROPOSED MODEL:**

The mechanical power from the engine is converting as electrical power and stored in the battery and utilized. The complete working process of this mechanism is discussed below. As the engine starts, the piston reciprocates inside the cylinder and this reciprocating motion is converted into a rotary motion of the crankshaft. At the left end of the crankshaft, a magnet is connected, which rotates along with the crankshaft. This magnet is surrounded by the electric coil. The magnet creates a magnetic field around it. These coils are placed around the magnet. When the magnetic flux is cut by the coils, it creates an electromagnetic field, and the potential of this field is 14.5V to 15.5V.

➤ **RESULT:**

1. The trolley can rotate 360 degree about its own centre. In India there are generally using a pressure trolley or simple trolley. For the unloading of such trolley we require a large space for turning of trolley with tractor. But here in this project there are no such problem creat because the trolley can rotate 360 degree about its own centre and can unload in any direction although in congested area. The pressure trolley have leakage problem of fluid but in rotating trolley with lead screw mechanism this problem can overcome.
2. The trolley can move forward and reversed direction with the help of lead screw mechanism and it can oprate through remote.

➤ **CONCLUSION:**

Various tests are performed to analyze efficiency and results and evaluated based on speed and power. It is proved that the proposed mechanism is more effective than unloading mechanism commonly in use nowadays. The design and development of lead screw mechanism for rolling shutter is completed and it is safe to be implement in project for opening and closing shutter. This method of designing lead screw is useful for load is acting apart from the axis of lead screw. Using this calculations, we can conclude that it is possible to design lead screw in optimum way if it is in eccentric loading.

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