

A Review on Lorry Unloading System

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ABSTRACT

The main aim of this paper is to study of unloading system and their various components and find effects on various parameters. As we found for unloading the cement, grain bags, humans have been used which is a slow process of unloading of the bags. Due to which ideal time of trucks increases. So to fulfil requirement we have to make such system which will eventually reduce the ideal time of lorry and faster unloading takes place rather than traditional unloading in which human workers are used or waiting for workers which requires a lot of time. And, finally we are going to design the system which can easily unload heavy bags. In this system an overall design of the lorry unloading mechanism has been carried out. The dimensions of the main components have been determined for a load capacity of 50kg (490.33 N) having rope fall. Various dimensions for cross section of various shapes for unloading have been found. In this project we tried our best to design, fabricate and to make working model of lorry unloading system.

Keywords: Hoist, Actuator, wire rope, Cranes, Unloading.

I. INTRODUCTION

In our system, we will be using I section, wire rope, actuators, gear arrangement, DC motor, rope drum, DBT remote control, etc. Our system is a load lifting device that is provided with wire rope drum. It can be used to raise and lower the load of the semi finished or fully finished components or raw materials. We studied a system that is rigidly fixed to the ground or mounted on the rear side of vehicles. The system is operated by a operator with skilled technic. It is mostly employed for lifting or lowering heavier parts and moving from one place to another. The system needs to have more convenient apparatus to produce high lifting torque and gives better mechanical benefits to move the load that cannot done by worker. The system is mainly used in loading and unloading of goods in warehouse. It can also be seen in industry like automobile and manufacturing were assembly of heavy components are required. It is available various

ways or forms – all are made or chosen according to specific purpose or use. The size of cranes varies from the smallest jib cranes being employed in workshops, to the largest tower cranes being employed in tall building constructions. Mini-cranes can also be utilized in tall building constructions for facilitating in doing construction works on reaching some tight locations.

II. LITERATURE REVIEW

Work Design and Analysis of a lorry unloading System

The system of loading and unloading of component in industry or warehouse is been a major issue and need to improve. This give fatigue to the labour and health issue which lead to give an idea for improving a mechanism for loading and unloading system. In this there is a fixed system with static load to move the component. So we make an improvement in the system on the design and fabrication for mobile floor crane equipment with various facilities and feature to

issue a failure due to static load. In this system we have improve to bear a maximum load of 50Kg. the system consists of an actuator, era motor, wire rope , clamping device etc .The fabrication process involved selection of material, Design, cutting welding and Assembly. Arc welding is used for joining of two metals parts. This system is very useful for loading and unloading purpose and also improves efficiency and consume less time and cost.

A. N. Rudenko [1]:

In this book “Material Handling Equipment” divided into three parts.

In first part explains general information of material handling equipment and also mansions its application in industry, role in production. Enumerates the main types of material handling equipment. In second part, description of parts of hoisting machinery such as chains, ropes, pulleys, drums, braking gears, drives, hoisting, and lifting mechanisms of cranes. Various types of crane are also the subjects for practical designing wok. Design model and theory are given in their application to general-purpose machines. Special types of crane are not mansion in this book.

In third part, gives a brief description of elevators (lifts).

B. Yuantal Crane [2]:

M/S, Yuantal crane had introduced working principal of Electric overhead travelling crane. The motor is linked to the drum through gearbox. The wire rope winds in the drum and it connected through the pulley block and lifting appliance. Motor provides motion of positive and negative direction to drum according to that rolls or releases wire rope so that the sling and hoisting realizes lifting movement.

C. Indian Standard (807-2006) [3]:

This standard describes the design of structural portion for cranes, hoists, specifics permissible stresses and other details of design. In order to ensure the economy in design in reliability in the operation of this system. To deal with the subject conventionally,

cranes have been broadly classified into eight categories based on their nature of duty and number of hours in service per year. It is producers or manufactures responsibility to ensure the correct classification of the required cranes.

D. Indian Standard (3177-1999) [4]:

Indian standards are broader in concept and give a standard principle in a generalized form because of uniformity of a product or services. This standard covers the mechanical and electrical drives of the cranes. The components of crane are made with dimensions or design in accordance with the help of Indian standard as prescribed.

IS 3177-1999 covers all selection criteria of components in EOT crane such as lifting hooks, shafts, wire rope, rope drum, flanges, sheaves, bearings, gear boxes, couplings, fasteners, motor, etc which are required to make this system possible.

E. ElectroMech FZE [5]:

M/S ElectroMech had introduced a new design as “Double decked arrangement of trolley mechanism” in single failure proof EOT crane. They developed a single failure proof EOT crane by using two independent rope drums. Both the rope drums are driven by separate gearboxes and motors. Both the wire ropes revving are taken on alternate pulleys to maintain equilibrium of load in case of failure of one rope system or single mechanism. The hooks used are of duel design with dual attaching points thereby if one attachment falls, the other load path continues to support the load without excessive drop or swing.

G. Ranjendra Parmanik [6]:

Ranjendra parmanik in a post “Design of hoist arrangement of EOT crane(2008), he has discussed about the history of crane, various types of crane, application, the design of the hoist of EOT crane is done by algebraic calculations and a model design of the various parts of EOT crane

H. Dr. Frank Jauch [7]:

Dr. Frank Jauch in a post "Care, use and maintenance of wire ropes on cranes", he has discussed about drum. There are two types of drum he discussed: single layer drum & multi-layer drum. Both are used based on lifting capacity of an object. He has also discussed about crane ropes.

I. Michael G. Kay [8]:

Material handling (MH) 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.

It is often said that Material Handling only adds to the cost of a product, it does not add to the value of a product. Although Material Handling does not provide a product with form utility, the time and place utility provided by Material Handling can add real value to a product, i.e., the value of a product can increase after Material Handling has taken place.

J. Wire Rope

When a large amount of power is to be transmitted over along distance from one pulley to another then wire rope is widely used in elevators, mine hoist, conveyors hauling devices and suspension bridges. The wire ropes run on a grooved pulley but they rest on the bottom of the grooves and are not wedged between the slides of the grooved. The ratio of driving tension for the rope drive may be obtained in similar way as v-belt which gives as the advantages like lighter in weight, silent operation. The wire rope can withstand shock loads, more reliable and durable. It does not fail suddenly which gives us high efficiency and provide low cost. withstand shock loads, more reliable and durable. It does not fail suddenly which gives us high efficiency and provide low cost.

III. CONCLUSION

1. From the above survey we also recognised that in industries for unloading bags small unloading systems are used outside the vehicle and near to warehouses.
2. Small unloading cranes like Jib cranes, hoists, etc are used for lifting purpose or to move the heavy loaded parts from one place to another.
3. As per the study, we found that some of the traditional system used in unloading lorries has rigid construction, consisting of various hydraulics and pneumatics systems inbuilt in the vehicles which utilizes more space, increases the cost as well as maintenance of the system.
4. As per our survey we found that in small lorry, retail shops does not have such facilities. For unloading purpose human workers are used for unloading cement, grain bags like material. At such places there is unavailability of workers to unload the vehicle. Hence, the ideal time of the vehicle and driver is increased which causes the decrease in productivity of the vehicle.

So, focusing on retail shops and small lorries where productivity of the vehicle is considerably low due to lack of manpower. Therefore, we have targeted this particular problem to be resolved and optimum solution that can be operated by driver only is taken into consideration.

IV. RESULT

The proposed system will be flexible for small vehicles which are used to transport the bags from warehouse to retail shops such vehicle includes TATA 407, TATA 307, Pick-up vans, etc. There will be no need of extra labour to unload the vehicle. The driver itself will be capable of operating the proposed lorry unloading system.

The proposed lorry unloading system may reduce the human fatigue caused due to unloading of heavy bags.

It will also increase the productivity of the vehicle, as it can be used any time on any lorry with minimum time as compared with traditional unloading systems.