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DESIGN AND FABRICATION OF BATTERY OPERATED REMOTE CONTROL ARTICULATED FORKLIFT

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ABSTRACT

Industrial operations require continuous flow of material form one workstation to another in industries. This is done manually in most of the small scale industries due to the lack of high initial investment in powered material handling equipments and also the increased maintenance costs of the same. The proper and timely flow of material not only reduces the transit time across the industrial floor but ultimately reduces the time required for the production resulting in increased profits and increased production. This project deals with the concept of portable electric remote controlled forklift for material handling industries. The proposed project consists of development of portable electric remote controlled forklift which can operate with material handling forklift attachment incorporated to the same. This is not only cost effective but also helps in increased industrial productivity.

Keywords :Base (Chassis), DC motor, Chain drive , Differential gear box ,Remote Controlled System

I.INTRODUCTION

Nature of problem: When you're working with forklifts, *any* problem can be serious trouble. You need to know how to recognize the faults, and assess the risks, both in terms of onsite safety and downtime caused by mechanical or other failures. Regular forklift maintenance reduces the risks enormously, but be aware that problems will occur, sooner or later.

In general the forklift can be defined as a tool capable of lifting hundreds of kilograms of weight. A forklift is a vehicle similar to a small truck that has two metal forks on the front used to lift cargo. The forklift operator drives the forklift forward until the forks push under the cargo, and can then lift the cargo several feet in the air by operating the forks. The forks, also known as blades or tines, are usually made out of steel and can lift up to a few tons.

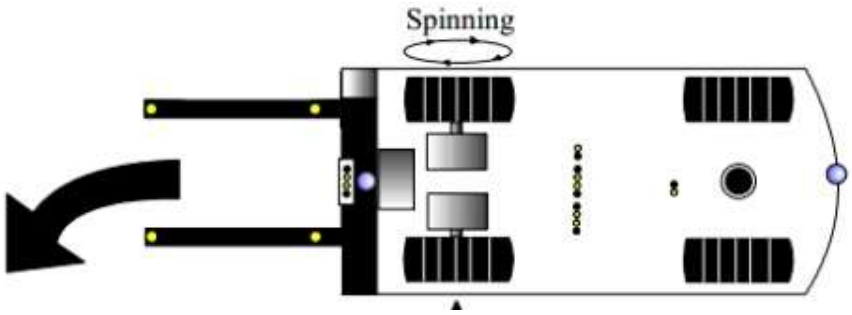

Fig.1

A fork lift one passes on the road may look like a fairly modern invention, but these machines have actually been used for at least the past 2000 years, if not longer. The Romans used forklifts to build huge monuments. Medieval churches were constructed with them. Also, the Egyptians may have used them to create pyramids. The modern version can be either simple or complex, and forklifts vary based on their application.

An ARTICULATED FORKLIFT is a vehicle which has a permanent or semi permanent pivot joint in its construction, allowing the vehicle to turn more sharply. The word articulated come from Latin articles: small joint. Construction of Battery Operated Forklift" aims at eco-friendly and fuel efficient and robust working with easy material handling and reducing the number of accidents as it is remote operated. We also focused on reducing the number of man power required during the loading and unloading operation of forklift. Though it is remote operated not only the skilled labor but unskilled labor can also operate as it does not require any special training. This forklift will provide better visibility and thus reduces the number of accident and helps in safe transportation to the destination.

II.COMPONENT DESCRIPTION

2.1 Chassis

2.2 Drive Train

2.3 Power supply

2.4 Control System

2.5 The forklift mechanism.

2.6 The remote control system

2.7 The steering mechanism

2.1. Chassis

The chassis is the integral part of the Portable electric forklift which houses all other materials of. It forms the structural skeleton of the vehicle.

Fig. 2

The chassis is made so as to provide maximum protection to the internal components as well as compact in nature to keep the vehicle portable and light weight. The chassis is fabricated from ERW steel bar .

2.2.Drive Train

The drive train involves the prime mover which converts the electrical energy from batteries into required mechanical energy to drive the Forklift. The energy from the prime mover is supplied to the drive train which consists of reduction drive to convert speed into torque. The Output of the drive train is supplied to the wheels which are used for locomotion of the developed machine.

2.3. Power Supply

The power Supply module consists of the rechargeable battery pack and the charging unit of the electric forklift. The domestic power supply available India is 230 V AC. This electric forklift is equipped with electrical circuit to convert the input supply of 230 V Ac into DC and charge the batteries.

2.4. Control System:

The Forklift moves forward, backward, left and right using this control system. The control system also helps to navigate in different direction other than those mentioned above. This also facilitates the turning on and off of the Forklift. For safety reasons the Forklift is also equipped with a kill switch which kills the supply in emergency conditions. This kill switch is also the part of control system.

2.5. The Forklift mechanism:

The forklift mechanism consists of a forklift and the mechanical drive train to lift and lower the material. The drive train consists of the mechanism which can move the forklift linearly up and down as required.

2.6.The remote control system:

The remote control system helps to control the forklift remotely from a distance. This phase involves development of Remote control system using microcontroller and controlling the forklift from a distance.

2.7. The Steering mechanism:

Since the developed vehicle is 4 wheel designs, the major focus of the project is on steering systems. The steering mechanism requires differential so that the vehicle can smoothly turn. This phase involves development of steering mechanism of the same.

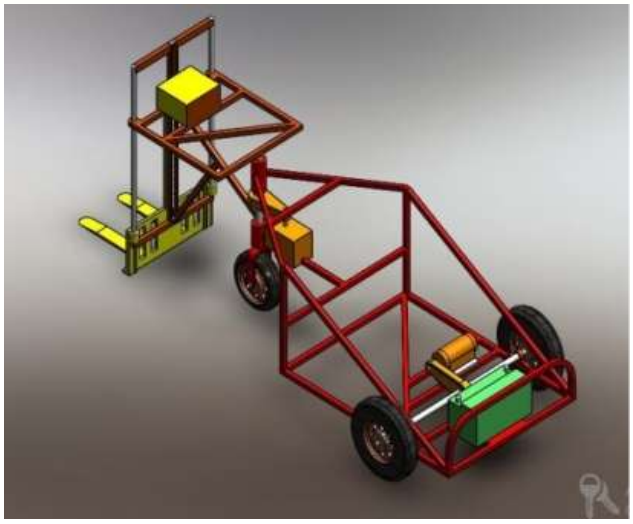

Fig.3

III. WORK ACTIVITIES OF FORKLIFT TRUCK

Forklift trucks are vehicles designed to move and stack heavy or bulky goods. They are mainly used in warehouses, stockyards and other storage areas. Forklift trucks are highly mobile with a very small turning circle which allows them to move easily in confined spaces. On the front of the truck are two forks operated by hydraulics. The driver must fit these forks into the pallets on which goods are stored. The operator then uses the hydraulic forks to lift the pallet, takes it to where it is needed and sets it down.

Some goods, such as bricks, can be moved by fork-lift trucks without the need for pallets. They are stacked in bales with spaces for the forks. The operator must work carefully as these goods are not protected by pallets. Some trucks are fitted with small computer display panels that direct the operator where to place goods in the warehouse.

Operators may also have to keep records and follow instructions written on a worksheet. They are also responsible for the basic maintenance of the truck. This includes greasing or oiling parts and changing or recharging the battery. Forklift truck operators may have to work in a noisy and dusty environment. Working outdoors in all weather conditions may also be necessary.

Industrial lift trucks are used for handling materials, parts, products, tools, equipment, supplies and maintenance items. Forklifts are efficient for material handling because they are self-propelled, maneuverable and require only one operator to lift, transport, and stack or un-stack the material. Forklifts may be used for indoor or outdoor use depending on their size, tyres and load capacities. The major factors that lead to injuries involving the use of forklifts include unsafe driving and material handling practices.

IV.CONCLUSION AND FUTURE SCOPE

The project work “Battery operated forklift” is aimed to control through wired communication. The main advantage of using this technology is to increase the safety of operator by operating the forklift from certain distance. This increases the efficiency of the productivity, because human errors due to the poor visibility can be minimized. The system is designed and developed successfully, for the demonstration purpose prototype model (mini model) is constructed. Most of all human safety is a major concern’s by using a remote controlled forklift.

The main advantage of using this technology is to increase the safety of operator by operating the forklift from certain distance. This increases the efficiency of the productivity, because human errors due to the poor visibility can be minimized. The system is designed and developed successfully, for the demonstration purpose prototype module (mini module) is constructed & results are found to be satisfactorily. After going through these collected data and statistics from various journals as well as research papers; we came to conclusion that remote controlled fork lift is the only way to stop such industrial issues like labour cost, hazardous material handling. Most of all human safety is a major concern's by using a remote controlled forklift. We can use our human brain but the hands and legs of a robot, and thereby nullifying the chances of accident.

Our project has a simple electrical heart and a simple mechanical body. As this is the simplest one, we have got wired remote for manual operating. It can be modified into any high class application. Considering the project time and all the necessary steps, we concluded this project is the right one. Since just a simple modification in its mechanical arm and movement way, we can convert into any robot that can perform a special type of work.

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