

DESIGN AND FABRICATION OF TWO-WHEEL FORKLIFT FOR INDUSTRIAL PURPOSES

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Abstract - Forklifts are used to move large and heavy loads, the size is adjustable to adapt to loads of different sizes and to seal warehouse conveyors. The adjustable width allows the conveyor to replace relatively thin passages. A high degree of maneuverability is achieved through the use of steering drive wheels; the lifting of the load is carried out by the mechanism of self-propelled mechanical equipment located on both sides of the conveyor. Conveyor operation is controlled by a manual control unit. An elongated vertical element mounted on a mounting element movably mounted on a truck frame and at least one loading device, the loading device having at least one loading part and two mounting parts, the mounting part can pass through the corresponding vertical element Insert into the opening in the center, and fasten the elements such as pins or bolts passing through the alignment holes through the vertical members and the fastening parts to fix the fastening elements in place, and the fasteners are spaced between the corresponding vertical elements. This can also be achieved by a combination of fork tips. Each fork tip has a loading port and a fastening part, which can be inserted into the upper or lower end of the opening of various vertical supports, or a tool extender, the loading part of which is suitable. The container interacts, its fastening material can be inserted into the upper open end of the vertical element and activate a 180-degree movement.

Keywords: Forklift forks., life, machine, weights.

1. INTRODUCTION

A forklift or a lift truck (also known as counterbalanced truck) is a powered industrial vehicle, a truck to be specific, which enables the lifting, shifting, and movement of materials from one place to another in an industry. Its primary applications are in warehouses, shops, and construction sites, wherein it is used for the transshipment of goods. The earliest forklift truck was invented between 1914 and 1915 and put on the market in the 1930s. The widespread usage of forklifts

started in the period of World War II as a result of the surge in the demand for transporting military materials. After World War II, maneuverable forklifts found their integral role in warehouses, for lifting the goods to heights. To cater to the needs of the warehouse sector, suitable modifications were made in the design framework of the forklift; a remarkable one being the development of Electric forklifts that were powered by batteries that required frequent charging. Forklifts can be electric-powered or diesel-powered. Electric forklifts are ideal to be used in areas with lesser ventilation because they are quiet and do not exhaust. Electric forklifts have lower operating costs than diesel-operated ones. However, their lifting capacity is limited to 3000 kg. Their batteries can take as long as 16 hours to charge and cool off, and have a slower acceleration than the trucks that run on diesel. Diesel-powered forklifts were used outdoors due to the production of exhaust gases. They cost less than electric forklifts to buy, but they have higher ongoing costs, as they need frequent refueling. It is capable of lifting weights in the range of 1000-25000 Kg's, which makes them ideal for heavy-industry situations and under in all types of weather.

2. LITERATURE REVIEW

2.1 Burinskiene: "The Travelling of Forklift in Warehouse". Retrieved 2008-01-22.

After conducting an intensive literature review, it was found that Extreme pressure is placed on all functions of a traditional warehouse. The warehouses have to be flexible and can increase or decrease their operations to meet any demand. This has both advantages and challenges. A key advantage is that warehouses are ready to underlay economic trends and seasonality. A key challenge is that they have to stay competitive in today's market. This means that managers and engineers must continue to improve the performance of their warehouse operations.

2.2 Brindley, James (December 2005). "The History of the Fork Lift".

Warehouse & Logistic News. Archived from the original on 2009-08-31. Retrieved 2008-01-25. In 1906, the Pennsylvania

Railroad introduced battery-powered platform trucks for moving luggage at their Altoona, Pennsylvania train station. World War I saw the development of different types of material handling equipment in the United Kingdom.

2.3 Dr. R. N. Mall (2013), Automated Guided Vehicle, ISBN 2091 Journal, MMMEC, Gorakhpur.

In the market there are several types of forklifts are used in warehouses. These forklifts are either powered by gasoline, propane, or electricity but they are more difficult to maintain and fuel can be costly which takes more space. To overcome this entire problem, we designed and fabricate the wheel forklift which drives on electric power, and loading & unloading is done by a hydraulic jack through forks.

3. OBJECTIVE

In this project, we investigate a forklift design that is new and different from the existing design. The new design offers two features:

1. The forklift attached to the frame body end.
2. The other feature is that the new lifting mechanism by using a chain and gear which is connected to the fork where it is easy to lift and more compact compare to the existing design.

The remainder of this thesis describes more features and details. And also, we do analysis and calculation work on the model to make sure it is stable and safe under different working conditions.

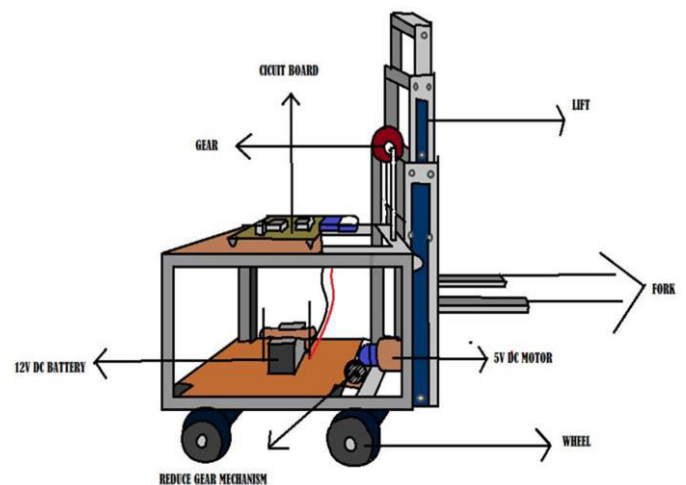
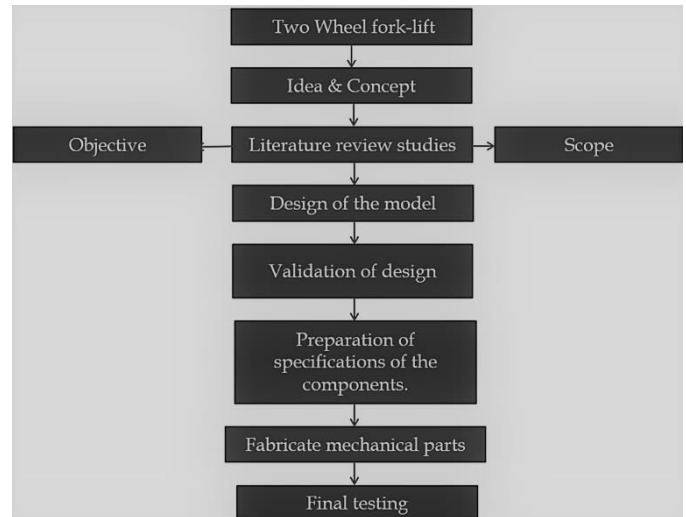
The basic system of a forklift Usually a fully functional forklift would consist of the following major system.

1. The power system,
2. Driving system,
3. Control system,
4. Loading system

But in our design, we are only concerned with the loading system, since we are not going to focus on the power, driving, and control system only we will give basic information in the following two sections the power system will be included in the driving system.

4. METHODOLOGY

A forklift; is known as a self-generated vehicle, and maybe a battery-powered industrial machine; in which purpose is for material handling among compounds, especially the potential to raise weights to be positioned at a certain height, also to lowers them as per needs. These are connected with specific attachments, the fork elevated machine is also made to perform alternative connected functions like the transfer masses from slip sheets onto pallets, also to clamp them or to invert them. The chassis was designed to sustain a static load of 80 kg



The rear wheels hold the motors and are attached to the frame or casing. The driving motors are housed below the frame. The frame incorporates a hole for attaching the front wheel, and; for attaching the fork lifter. D.C. motor is utilized in our project for moving fork, and carrying objects from one location to another; our project consists of two motors to run the 2 wheels; whereas the lifting portion is completed by lead screw and it is connected to another motor. The battery provides power to the motor. The battery is placed at the front platform and a 12-volt battery is used to provide power.

A. Components used

The components used in the project Two Wheel Drive Fork Lift is as follows:

- DC Motor



- Battery



- Bearing



- Spur gear and chain



- Lead Screw



- Wheels



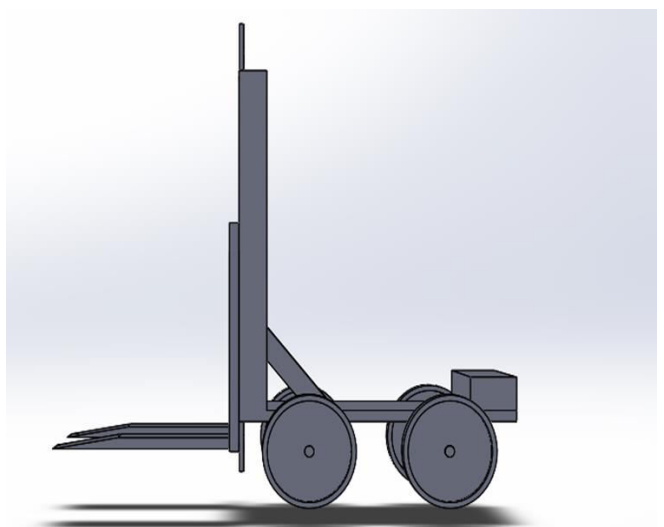
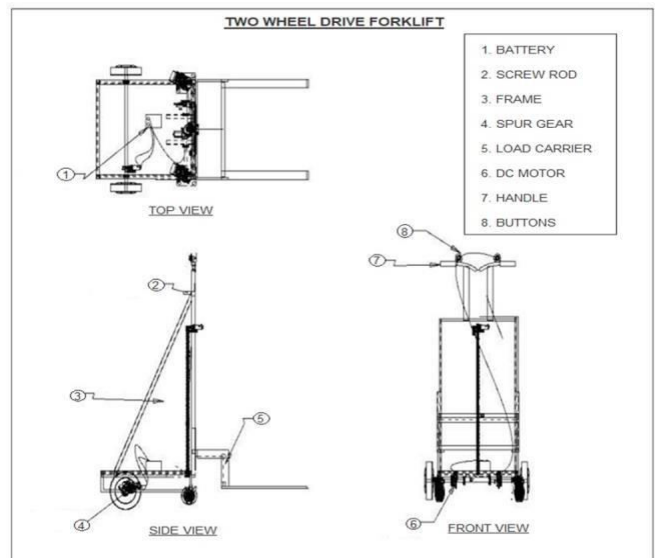
5. WORKING PRINCIPLE

The forklift mechanism runs through the Semi-Electric method.

In this method, power shifted from one place to another make use of mechanical along with electrical elements. The project works on the action of rotational motion transfer into linear motion. For this cause here 12V, 2.5A D.C motors are used.

The arrangement of the motor is connected with the wheel shaft. The vehicle is run through the motor. The motor is attached to the battery. The motor is also connected with the spur gear to increase the torque and the wheel is directly coupled by the torque in the form of bearing so the vehicle can run. There is a control unit that controls the motor actions. The major causes of the vehicle are no pollution occur. The lead screw is assembled vertically on the guide column and the attachment of the fork is done with the lead screw. With the help of the motor, the rotational motion of the lead screw is transforming into linear motion. The front line of the platform the forklift positioning is assembled. The safety is the main consideration we took for the design of the forklift, where the forklift is in the course of loading and the stability of moving system consist point of 3 contacts, 2 rear rotary wheel drives, and in front 2 supporting wheel are placed.

6. DESIGN OF EQUIPMENT AND DRAWING



CAD DESIGN OF THE MODEL

7. PHYSICAL PARAMETERS OF THE COMPONENTS USED

1. Dimension of Base

- Length of base: 30cm
- Width of base: 25 cm
- The thickness of base: 3 cm
- Height of bed from the flat surface: 10 cm

2. Dimension of sliding mechanism

- Forklift Beam Height: 40 cm
- Forklift Max Reach: 30cm
- Fork Length: 7 cm
- Fork Width: 4 cm

3. Motors used

- Type: DC Motor
- Capacity: 12v & 1 Amp
- No. of Motor Used: 3

8. COST ESTIMATION ANALYSIS

Sr. No	Part/Product	Qty.	Cost
1.	Structure	4	2000
2.	Motor	3	1500
3.	Wheel	4	2000
4.	Nut & bolt	20	100
5.	Bearing	6	500
6.	Battery	1	1500
7.	Lead screw	1	1000
8.	Chain and sprocket	2	200
9.	Joystick	1	200
10.	Miscellaneous		1000
11.	Total		10000 INR approx.

9. ADVANTAGES, DISADVANTAGES, AND APPLICATIONS

A. Advantages

- Ease of maintenance (including checking and cleaning).
- Easy for repairing.
- Ease of lifting the loaded light vehicles.
- Ease of handling.

- Ease of replacement of any parts.
- A clean, green, eco-friendly machine.

B. Disadvantages

- Time consumption is high.
- The initial cost is high.

C. Applications

- It is also used in small-scale industries.
- It can be used in industries, factories, etc.
- In factories and storage godowns, for storage and transshipment of large goods.
- Movement of light goods weighing 40-60 Kgs, which is cumbersome by human labor.

A Two Wheel Drive Forklift is used for this purpose as it is fast, efficient, has lesser power consumption, and requires lesser space for its movement.

10. RESULTS AND DISCUSSIONS

This project work has been completed in a limited time and hence we are proud to announce that “The Two-Wheel Drive Forklift” can fulfill the expectations.

All the parts are connected in such a way that the equipment can be maintained and assembled easily. In this work, we can achieve the target of reduction of the size of a forklift, and hence the new model can move through narrow passages and lift the load in a storehouse.

We successfully conducted the test of load lifting and we are happy to announce that the forklift design made by us was able to lift the load of 80Kg under satisfactory conditions.

11. CONCLUSIONS AND FUTURE SCOPE

The purpose of this paper was to focus on solving problems at the warehouses using the forklift to carry a load of lighter weight and making it efficient n reduce the accidents happening in warehouses due to large forklifts. The two-wheel forklift is designed keeping the center of the idea to increase work efficiency, reducing power consumption, smaller dimension and hence aisle for movement in narrow space of warehouses, high safety factor, time-saving application, easy controlling from onboard

This project has provided us a plethora of opportunities and experiences, within the bounds of our limited knowledge. Not only did it enlighten us with theoretical knowledge, but it also inculcated practical knowledge regarding planning, purchasing, assembling, and machining in us. It is a matter of immense happiness and pride for us in having been able to complete this project successfully in a limited period. We have done everything in the best possible way we could by overcoming the various constraints and by utilizing all the available amenities. The current system can be modified for lifting heavy loads by using a bulky lead screw and a high-

power motor. The size of the forklift can be further reduced for easy handling and movement the foldable designs can be provided for transporting it in light motor vehicles.

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