

# Design and Fabrication of 2-Wheel Drive Forklift

M. T. Adithya Krishna<sup>1</sup>, P. P. Athul<sup>2</sup>, C. Sahin<sup>3</sup>, C. K. Shibi<sup>4\*</sup>, V. Lokesh<sup>5</sup>

<sup>1,2,3,4</sup>Student, Department of Mechanical Engineering, Srinivas Institute of Technology, Mangalore, India

<sup>5</sup>Associate Professor, Dept. of Mechanical Engineering, Srinivas Institute of Technology, Mangalore, India

\*Corresponding author: shibi61297@gmail.com

**Abstract:** A fork-lift carrier for transporting long heavy loads, having adjust width for accommodating various size loads and for compacting the carrier for storage. The adjustable width allows the carrier to negotiate relatively narrow passages. A high degree of maneuverability is achieved by utilization of independently driven and steered traction wheels. Raising and lowering of loads is accomplished by motorized operated forklift mechanisms disposed on either side of the carrier. Operation of the carrier is controlled by a handheld control unit. A load carrying arrangement for a lift truck includes two spaced apart hollow upright elongated members which are mounted on a mounting element that is displaceable mounted on the frame of the truck, and at least one load-engaging attachment which has at least one load-engaging portion and two mounting portions introducible into the interiors of the corresponding upright members through the open ends thereof to mount the load-engaging attachment on the upright members and thus on the mounting element. Fixing elements, such as pins or bolts extending through aligned bores in the upright members and in the mounting portions, position ally fix the mounting portions within the corresponding upright members. The attachment may be constituted by a pair of fork prongs each of which has a load-engaging portion and a mounting portion which is introducible either into the open upper end or into the lower end of the respective upright member, or a container spreader whose load-engaging portion is adapted to engage a container and whose mounting portions are introducible into the upper open ends of the upright members & turn on 180-degree motion.

**Keywords:** Design and Fabrication, 2-Wheel Drive Forklift.

## 1. Introduction

A forklift or a lift truck (also known as counter balanced 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 since 1930s. The widespread usage of forklift started in the period of World War II as a result of the surge in the demand of transporting military materials. After the World War II, maneuverable forklifts found its integral role in warehouses, for lifting the goods to heights. To cater 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

which 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 those run on diesel. Diesel powered forklifts were apparently used outdoors due to 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 1000-25000 Kg's, which makes them ideal for heavy-industry situations and under in all types of weather.

## 2. Literature Review

### A. Pennsylvania Railroad at Altoona

Pennsylvania Railroad at Altoona introduced a power accumulator in 1906 to a baggage wagon to a primary power truck. The primary transportable lift into a Patent and Trademark.

### B. Dr. R. N. Mall

There are different types of forklift around us that are powered by gasoline, electricity but they are very much tough to handle and fuel that are used are very much costly. To solve these criteria, we introduced a 3-wheel forklift that run on both electric power that are used for loading and unloading using hydraulic jack by forks.

### C. Tiny Crane Mounted on a Platform Truck

Truck was introduced in 1913 that are a combination of both vertical and horizontal handling that are molded on a tiny crane on a platform truck. The hydraulic power that are introduced and development of electric vehicle and utilization of standardized patents in late 1930's.

### D. Low Back Pain in Port Machinery

In 2002 M. Bovenzi Pintobn Stacchini introduced different varieties of low back pain that was investigated by a standardized questionnaire in a meeting of 219 port machinery operators exposed to whole body vibration & postural load in a meeting of 85 workers that are working in a same company. These consists of forklift truck driver, straddle carrier drivers

and other workers like crane operators and other company workers. The importance of the low back symptoms was much higher in the working of forklift drivers than others workers.

### 3. Objectives

In this project we look over a forklift model that are entirely different from existing model.

Two features offering the design,

- The forklift mounded to the frame body.
- The new lifting mechanism by lead screw where it is easy to lift and more compact.

The other things show about more features and details. And make sure it is stable and safe under different working condition we keep observe and calculate always.

Following these are the major system consists functional forklift.

- The power system
- Control system
- Loading system
- Driving system

In this design we only consider the loading system instead of power, driving and control system. We only provide basic information because power system will be introduced in the driving system.

### 4. Methodology

A forklift; is known as self-generated vehicle, and may be a battery-powered industrial machine; in which purpose is for material handling among compounds, especially the potential to raise weights to be positioned at 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 is attached to the frame or casing. The driving motors are housed below the frame. The frame incorporates hole for attaching 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 other; our project consists two motors to run the 2 wheels; whereas the lifting portion is completed by lead screw and it is connected to another motor. Battery provides power to motor. The battery is placed at the rear platform a 12-volt battery used to provide power.

#### A. Components used

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

- DC Motor
- Battery
- Bearing
- Spur gear

- Lead screw
- Wheels

### 5. Working Principle

The forklift mechanism run through 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 action of rotational motion transfer into linear motion. For this cause here 12V, 2.5A D.C motor are used. The arrangement of motor is connected with the wheel shaft. The vehicle is run through the motor. The motor is attached with 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 which control the motor actions. The major causes of the vehicle is no pollution occur. The lead screw is assembled vertically on the guide column and the attachment of fork is done with the lead screw.

With the help of motor, the rotational motion of the lead screw is transforming into linear motion. The front line of platform the forklift positioning is assembled.

The safety is main consider we taken 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

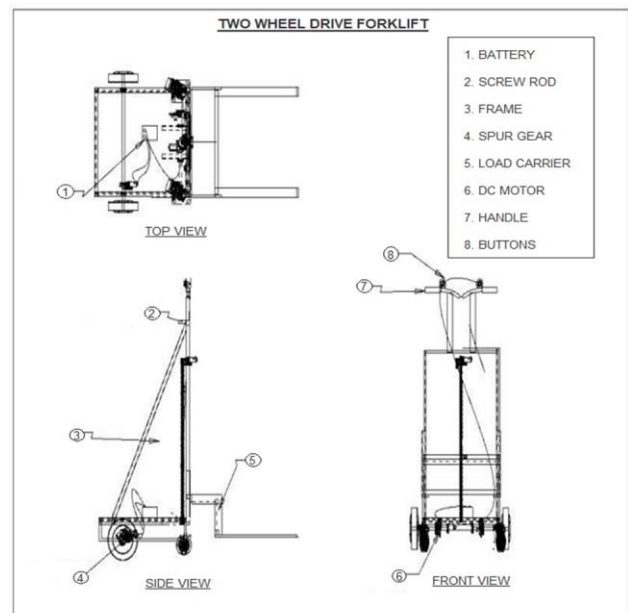


Fig. 1. Equipment drawing

### 7. 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.
- Initial cost is high.

#### C. Applications

- It is also used in the small-scale industries.
- It can be used in the industries, factories etc.
- In factories and storage go downs, for storage and transshipment of large goods.
- Movement of light goods weighing 40-60 Kg's, 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.

### 8. 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" is able to 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 are able to achieve the target of reduction of size of a forklift and

hence the new model is able to move through narrow passages and lift the load in a store house.

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 load of 80Kg under satisfactory conditions.

### 9. Conclusions and Future Scope

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, it also inculcated practical knowledge regarding planning, purchasing, assembling and machining in us. It is a matter of immense of happiness and pride for us in having been able to complete this project successfully in a limited span of time. 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 load by using bulky lead screw and 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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