

Four Wheel Drive Fork Lift Vehicle in Industry

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Abstract

Forklift is a small industrial vehicle, having a power operated forked platform attached at the front that can be raised and lowered for insertion under a cargo to lift or move it. Forklifts serve the needs of various industries including warehouses and other large storage facilities.

Forklifts are powered by electric battery or combustion engines. Some Forklifts allow the operators to sit while driving and operating the machine while others require the operator to stand. It is being extensively used throughout the industry for transporting materials and goods.

Keywords: *Lower Frame, Upper frame, Fork, Carriage Support rod, Axle Shaft, DC motor, Solar panel, Battery, Forward reverse switch.*

INTRODUCTION

The four Wheel Electric forklift is a small electrical vehicle designed to build a cheap forklift for industry warehouses & domestic purpose. A goods transportation device which can drive by any one. Safe movement during picking, stacking and traveling with loads. The dynamics of the vehicle is simple to the control the vehicle which means that it is stable. This is

prevented by two small supporting wheels for balance the vehicle and its time derivative, controlling the motors to keep the vehicle balancing. This kind of vehicle is interesting since it contains a lot of technology relevant to an environmentally friendly and energy efficient transportation industry. The rider controls are supposed to be natural movements; leaning forwards or backwards and the direction of the

vehicle is obtaining by giving the DC supply only one motor. Factories, industries and storage go downs need forklifts and cranes for storage and moving large goods. Also there is a number of good weighting around 30 - 50kg that are comparatively lighter but cannot be moved around easily by human labour. To fill this need we here propose a 4 wheel drive forklift to lift and transport such medium weight goods across factories & industrial warehouses. The 4 wheel drive a fast, efficient and low power consumption vehicle that does not require much space to move around.

The mini forklift will run on 2 PMDC motors and can drive small weight with pickup arrangement across small distances easily. For this we use a mini 4 wheel vehicle body frame designed with a platform with 4 motorized wheel mounts. It has a perpendicular handle ahead to hold on the operator. Also we design a forklift type mechanism on the front handle of vehicle using 4 bent metal strips and lifting mechanism.

The lift mechanism comprises of large supporting rod for sliding the carriage. This mechanism is connected to a linear actuator. We now mount the control circuitry on the vehicle with wires that

allow the vehicle to be controlled by person. Thus we provide an easily controlled forklift for small goods transportation in industrial sector. The demonstration version can lift 30-50 kg to demonstrate the concept.

PROPOSED SYSTEM IS DIFFERNT

Truck Frame

Truck Frame is the most vital component which forms the base of the machine. All of the key components of the forklift including wheels, counterweight and mast are attached to the truck frame.

Counterweight

The Counterweight is a cast iron weight attached to the rear part of the forklift. The aim of the counterweight is to counter balance the load that is being lifted. On Electric Forklift, Counterweight is fixed to the lead-acid battery.

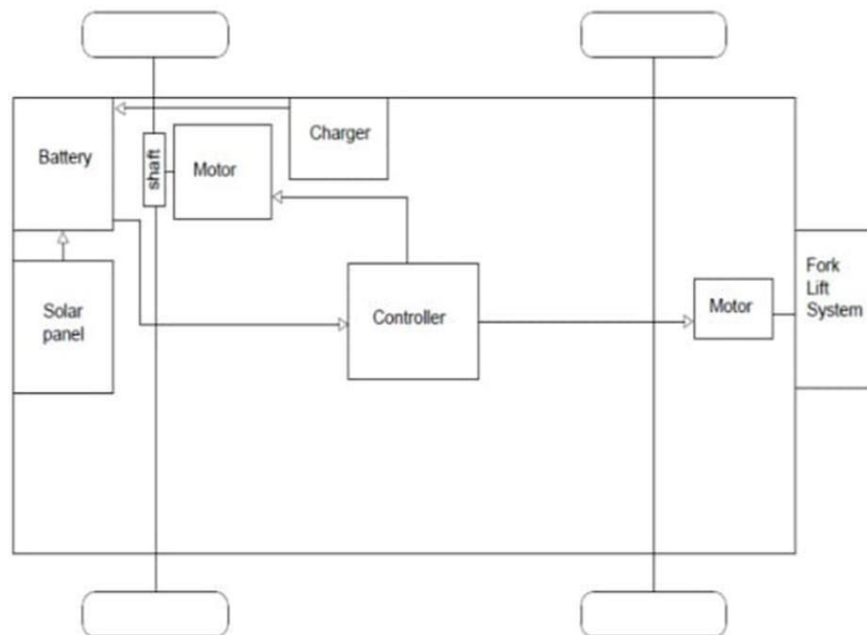
Power Source

The forklift's power source consists of and Electric Forklifts derive power from fuel cells or Lead Acid Batteries.

Carriage

The carriage serves as the base to the forklift. The Carriage is fixed on mast rails so that it can be easily moved upward and downward.

Block Diagram



WORKING

Electric Forklifts derive power from Lead Acid Batteries. The carriage serves as the base to the forklift. The Carriage is fixed on mast rails so that it can be easily moved upward and downward. The Mast is a vertical part that lifts up and pushes down the loads.

A motor is a device that converts electro-chemical energy, provided by an industrial rechargeable battery, into mechanical energy. The Electric motors are attached to the two main vertical structures called the "masts." However, the actual forks that carry the load are attached to the main body of the forklift through a pair of roller chain pulleys whose fulcrum is a gear at the top of the mast. Thus, the Electric

motor pushes the masts up, the gears on the masts push against the roller chain. Forklifts have two sets of controls: one for steering and one for lifting. The steering controls work much like those of a golf cart: acceleration pedal, brake, steering wheel, forward gear and reverse gear. Front-wheel steering allows the driver a greater degree of rotation and precision when handling a load.

METHODOLOGY

The methodology used for the design and fabrication of forklift is as follows. A total load of 100 Kgs is considered as the lift during the working process. The driving force was given by a single motor of 500 rpm, 36 W. This motor was selected based on efficiency of the motor which is

calculated as mechanical output power divided by electrical input power.

The efficiency of the motor for calculations was considered as 10% and output mechanical power is calculated considering the input electrical motor power as $5 \text{ A} \times 24 \text{ V}$ which is equal to 120W. So, based on above electric motor power the output mechanical power was calculated considering 500 rpm of the motor along with angular velocity and was estimated to be about 120 W. In order to power the motor and winch 2 car lithium-ion batteries, each of 12 V being used.

Merits

- Low cost, less complexity.
- No pollution.
- Easy to implement.
- Easy to control.

RESULTS



CONCLUSION

The system proposed here is overall efficient in all the way. In this research work, design and fabrication of forklift vehicle have been studied. From this research paper the following conclusions have been drawn.

1. The designed forklift has the ability to carry a maximum load of 40-50 Kg.
2. The forklift vehicle designed works on a solar panel & battery and it works continuously for 8 to 10 hours when once it is charged.
3. From the analysis it can be concluded that the designed forklift vehicle is able to with stand the load and is economical, reliable and environmentally friendly.
4. The specifications of the motor driving the forklift is calculated based on desired load and acceleration to be achieved.
5. From this research it can be stated that the forklift vehicle has been successfully designed and fabricated and a prototype model have been developed.

6. The scope for the further research includes research on forklift's weight change and stability during the turning and speeding process.

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