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Design and Fabrication of Electric Forklift

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Abstract: ***In today life there is wide of forklifts variety of forklifts from the large heavy loadings trucks to the one that works among narrow aisles forklifts have becomes one of basics transportation tools we use in our lives with all the forklifts in existence we find that there are some improvement that can be to bring forklifts to the better performance. We describe forklift powered by an electric motor instead of the IC engine using rechargeable batteries the main objective of this project is to design electrically powered forklift for material handling in industrial warehouses and workshops. Nowadays in industries, the forklift operates on an IC engine for transportation and hydraulic system for lifting and lowering of materials. Due to this mode of operation, there are many adverse environmental impacts such as emission of carbon dioxide and leakage of hydraulic fluid. Thus, this project aim to making the electric system into a forklift to make it electrically powered which lift to 1 ton kg and elevate up to 8 feet.***

Keyword: Forklift, Heavy Loads, Transportation, I.C engine, Industrial Warehouse, Environment, Electrically Powered.

I. INTRODUCTION

In general the forklift can be defined as a tool capable of lifting hundreds of kilograms. 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. Forklifts are either powered by gasoline, propane, or electricity. Electric forklifts relay on batteries to operate. Gasoline or propane forklifts are sometimes stronger or faster than electric forklifts, but they are more difficult to maintain, and fuel can be costly. Electric forklifts are great for warehouse use because they do not give off noxious fumes like gas powered machines do. Forklifts are most often used in warehouses, but some are meant to be used outdoors. The vast majority of rough terrain forklifts operate on gasoline, but some use diesel or natural gas. Rough terrain forklifts have the highest lifting capacity of all forklifts and heavy duty tires (like those found on trucks), making it possible to drive them on uneven surfaces outdoors. Forklifts have revolutionized warehouse work. They made it possible for one person to move thousands of pounds at once. Well-maintained and safely operated forklifts make lifting and transporting cargo infinitely easier. This is the general description of a normal forklift truck. To enhances the technology further, this prototype module is constructed with remote technology, there by the operator can walk along with the forklift for better visibility & the container can be placed accurately (precision position). This increases the safety of the operator.

II. LITERATURE REVIEW

A. Battery Operated Forklift Vehicle.

Dr.V.R.Gandhewar1, Kalyani R. Bhokare2, Chirag D. Pande3,Vaibhav G. Mali4, Ganesh V. Badaki5 Assistant Professor1, BE Student [2, 3, 4, 5] Department of Mechanical Jawaharlal Darda Institute of Engineering and Technology, Yavatmal, Maharashtra, India.
A FORKLIFT TRUCK is a powered industrial truck used to lift and transport. This vehicle is self-drive by the used of battery power and the lifting mechanism is also runs on battery power with the help of lead screw mechanism. There are already many types of forklift conveyer available since ancient time. But our aim is to design forklift conveyer pollution free by using battery and more efficient lifting by using lead screw The project work “Battery operated forklift” is aimed to control through lead screw. 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.

B. Design and Analysis of Mechanical Forklift

Khebude Karan N*, (B.E ,Dept. of Mechanical Engineering, Sanjeevan Engineering & Technology Institute, Panhala, MH, India
The Design Calculations of Fork are compared with Structural Analysis Report. The Lifting of Fork makes the Deformation and bending of fork. Due to selection of forklift material as mild steel it has increased the advantages of design due to its high specific stiffness and strength By Using the Mild Steel Material for the Fork the Deformation is minimum. The Results shows Mild steel is Strong wear resistance & Impact strength. The theoretical calculations are safe as it has compared with ANSYS Results.

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C. The Travelling of Forklift in Warehouse

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

In the warehouses forklifts are the most expensive machines. The study pays special attention to the travelling of these machines. Factories, industries and storage go downs need forklifts and cranes for storage and moving large goods. Also there are a number of goods weighing around 40 – 60 kg that are comparatively lighter but cannot be moved around In 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 three wheel forklift which drives on electric power and loading & unloading is done by hydraulic jack through forks. In general, there are a lot of activities in traditional warehouses.

D. Construction of Battery Operated Forklift

Krunal R. Dhivar Lecturer Department of Mechanical Engineering L.I.T. Sarigam, Valsad, India

Today all heavy engineering company uses Forklifts. Widespread use of the forklift truck had revolutionized warehousing practices before the middle of the 20th century.

A mixture of material handling systems is in the use, exact from that entirely physical to the ones that are semi-automatic but manually controlled. Forklifts have revolutionized warehouse work. They made it possible for one person to move thousands of pounds at once.

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.

E. Design of Electric Forklift used in Small industrial Warehouses and Workshops

Prof. Suryavanshi Amol V Faculty of Department of Mechanical Engineering, PCCOE Savitribai Phule Pune University

Nowadays in industries, the forklift operates on an IC engine for transportation and hydraulic system for lifting and lowering of materials.

Due to this mode of operation, there are many adverse environmental impacts such as emission of carbon dioxide and leakage of hydraulic fluid. integrate the electric system into a forklift truck to make it electrically powered The main boon of using the technology is to reduce the impact of fuel-based forklift also it lessons human efforts and their misconceptions. It’s not only user friendly but also environment friendly. It is highly affordable at a lower cost.

III. PROBLEM STATEMENT

A. Small scale industries having major problem related to cost of material handling system.
B. In markets forklift’s lifting mechanism is function on hydraulics, chain and screw based which is suitable for small loads.
C. 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.
D. Failure of any technology part.
E. Electric forklift are not as affordable as LPG, gas, or diesel equipment.
F. Charging electric forklift batteries can be tricky for multi-shift operation.
G. Forgetting to charge the battery overnight can result in significant productivity losses the next day.
H. Battery chargers have certain voltage requirements and the existing electrical service must meet those.

IV. OBJECTIVE

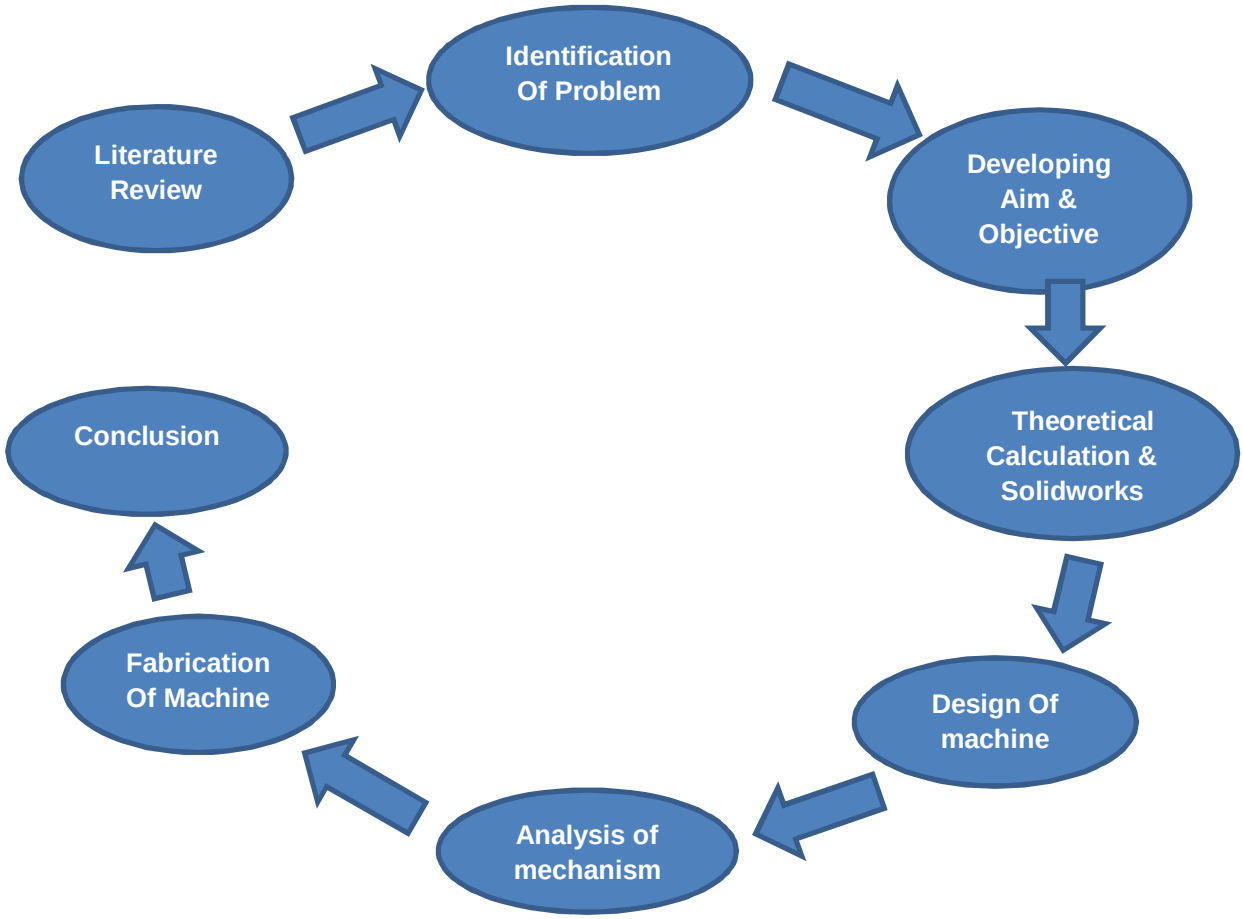
In this project we investigate a forklift design that is new and different from existing design. The new design offers two features, the forklift’s Lifting Mechanism. i.e. Pulley Mechanism which Working of Compound Pulley and 4 ropes Distributes the load and Divide Total Load by Four. So the effective Load on motor will be four time less then actual load of object. The other feature is that the Better Integrated Body design. Which Provide more balance and smooth sliding mechanism and wide Wheels provide more stability.

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V. RESEARCH AND METHODOLOGY

Although designs vary, the method followed for Project is:



VI. DESIGN OF EQUIPMENT AND DRAWING COMPONENTS

Fabrication of Forklift is consists of the Following components to full fill the requirements of Complete operation of the machine.

1. Ac Motor
2. Lifting Fork
3. Guide Column
4. Inner Column
5. Compound Pulley
6. Wire Rope
7. Bearings
8. Caster wheels
9. Limiter

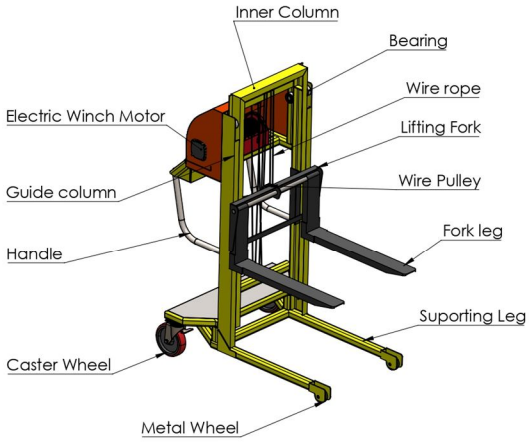


Fig. Electric Forklift

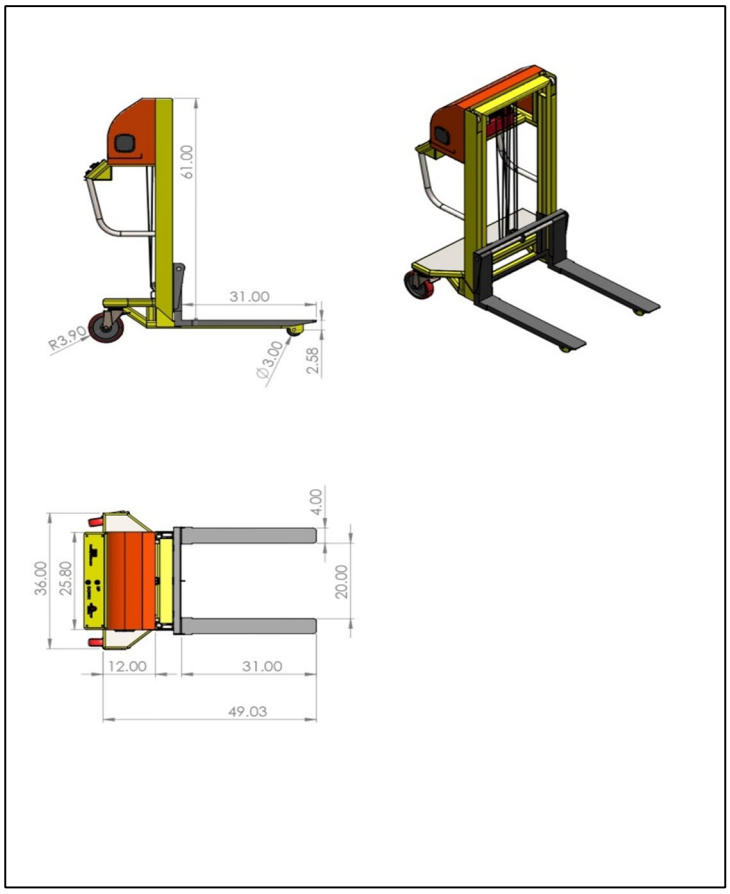


Fig. Solidworks Design

VII. WORKING PRINCIPLE

Forklift works on electrically powered hoist. The lifting mechanism consist of a compound pulley system combines a fixed pulley with a movable pulley (attached to the load). The mechanical advantage can be greater than with only fixed pulleys. With four wheels, the mass is supported by four strands of rope. This configuration gives a mechanical advantage of four, and it is possible to lift the load with one-quarter of the force of the load.

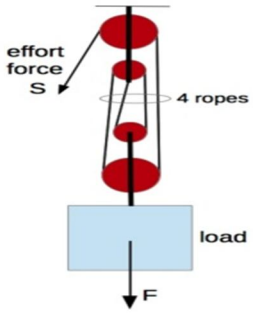


Fig. Compound pulley

Forklift can raise pallets over five ft and can raise them over 8 ft for placement on shelves. Unlike a pallet truck, simply use the control stick to effortlessly raise and lower heavy loads. Capacity of up to 1ton. Forks adjust from 9 to 28 inches, allowing them to accommodate different pallet sizes And a 180° steering arc and 58" turning radius makes them ideal for use in smaller warehouses and loading docks. The back wheels are 6 inch extra wide and provide extra stability to the load and keeps the operator safe and the emergency shut off switch provides additional safety by powering off the machine controls.

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VIII. CONCLUSION

The main boon of using the technology is to reduce the impact of fuel-based forklift also it lessons human efforts and their misconceptions. It's not only user friendly but also environment friendly. It is highly affordable at a lower cost. The project carried out by us made an impressing task in the field of production and manufacturing industries. this project will reduce the cost involved in the concern. Project has been designed to perform the entire requirement task at the shortest time available.

IX. FUTURE SCOPE

This project can be further also modified as rechargeable Battery Operated Hoist instead of Ac Supply by using ac to dc convertor and battery. And also dc motor can be implement for the driving.

REFERENCES

[1] Dr.V.R.Gandhewar1, Kalyani R. Bhokare2, Chirag D. Pande3,Vaibhav G. Mali4, Ganesh V. Badaki5 Assistant Professor1, BE Student 2, 3, 4, 5 Department of Mechanical Jawaharlal Darda Institute of Engineering and Technology, Yavatmal, Maharashtra, India "Battery Operated Forklift Vehicle.'' (2018 IJESC Volume 8 Issue No.4)

[2] Khebude Karan N*, (B.E ,Dept. of Mechanical Engineering, Sanjeevan Engineering & Technology Institute, Panhala, MH, India'' Design and Analysis of Mechanical Forklift'' International Journal of Scientific Research and Engineering Development-– Volume 3 Issue 2, Mar-Apr 2020

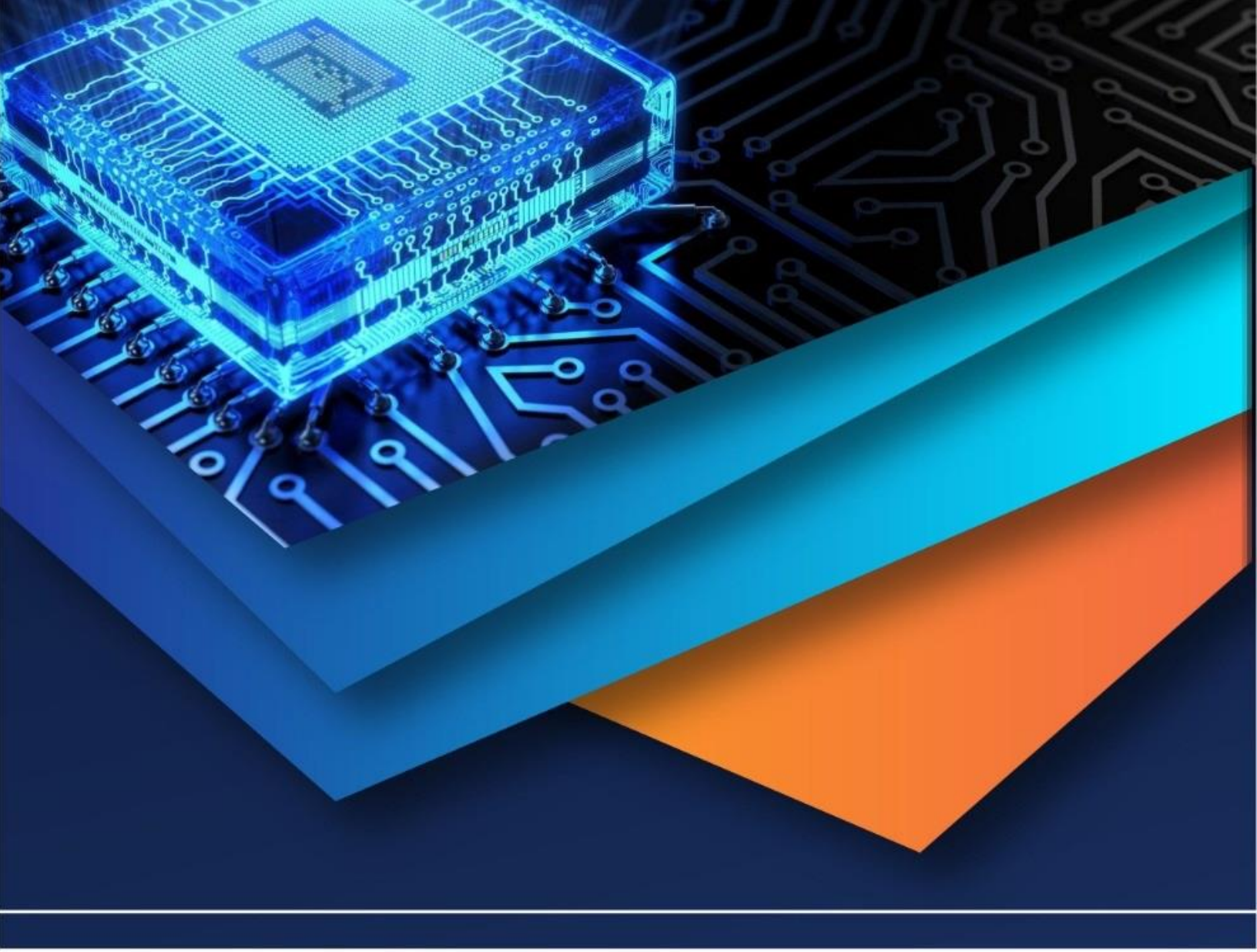
[3] Ugale Sachin,Salvi Tushar, Lanjekar Sachi, SKshirsagar Prashant , Mechanical Engineering Department, Final Year Students RMCET, Ambav, Ratnagiri,India." Design, Development and Modelling of Forklift'' International Journal of Engineering Research & Technology (IJERT ISSN: 2278-0181 Vol. 3 Issue 4, April – 2017)

[4] P. Naveenkumar Asst. Professor , Department of Mechanical Engineering , Hindusthan Institute of Technology , Coimbatore. N. Ashok, Dinesh Kumar, S. Mohamednizarudeen Ug Scholar , Department of Mechanical Engineering , Hindusthan Institute of Technology , Coimbatore. "Design and Analysis of Two Wheel Drive Forklift for Industrial Warehouses'' (IJERT ISSN: 2278-0181 ETEDM - 2018 Conference Proceedings IJERT)

[5] Krunal R. Dhivar Lecturer Department of Mechanical Engineering L.I.T. Sarigam, Valsad, India "Construction of Battery Operated Forklift" (IJSTE - International Journal of Science Technology & Engineering | Volume 2 | Issue 4 | October 2015 ISSN (online): 2349-784X)

[6] Prof. Suryavanshi Amol V Faculty of Department of Mechanical Engineering, PCCOE Savitribai Phule Pune University. "Design of Electric Forklift used in Small industrial Warehouses and Workshops" International Journal of Engineering Research & Technology (IJERT)

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