



## DESIGN AND ANALYSIS OF AUTOMATIC TWO WHEEL FORK LIFT DRIVE FOR INDUSTRIAL WAREHOUSE

A.B. Jadhav<sup>1</sup>, Saurabh Sawant<sup>2</sup>, Dnyaneshwar Khedkar<sup>3</sup>, Sahil Gaikar<sup>4</sup>, Rushikesh Jadhav<sup>5</sup>

<sup>1,2,3,4,5</sup> Department of Mechanical Engineering, Smt. Kashibai Navale College of Engineering, Pune.

<sup>1</sup>Abjadhav@sinhgad.edu

<sup>2</sup>Saurabh.sawant2600@gmail.com

<sup>3</sup>Dskhedkar2212@gmail.com

<sup>4</sup>SahilGaikarsg@gmail.com

<sup>5</sup>Jadhavrushikesh183@gmail.com

**Abstract** – A forklift truck is a powered industrial truck used to lift and move materials over short distance. In the industry it is also called as lift truck, jitney, fork truck and fork hoist. The main function of the forklift machine is to reducing human power. This project deals with the fabrication of two-wheel forklift, which transport objects in industries. Forklifts have become an indispensable piece of equipment in manufacturing and warehousing. In today's life, there is a wide variety of forklifts from the large heavy loading truck to the one that works among narrow aisles forklifts have becomes one of basics transportation tool. We use in our lives with all the forklifts in existence we find that there are some improvements that can be bring forklifts to the better performance. The 2-wheel drive is a fast, efficient and low power consumption vehicle that does not require much space to move around. The mini forklift will run on dc motors and can drive small weight with pickup arrangement across small distance easily. In this project use automation helps in reducing human errors.

### I. INTRODUCTION

On floor, lifting of heavy components is a hectic and risky job. Forklifts are always play an important role in heavy-duty work. If cargoes are being organize properly for the use of forklifts with the perfect attachment would be best way to load and unload, which would make the whole process less time-consuming. The fewer labors intensive in addition forklifts optimize the use of storage space by eliminating the need for many people to handle the loading and unloading operation. Mechanization reduces the human efforts and man-power but needs to be closer and more complex human supervision. If consistency and close supervision not provide, there might be costly process error occur. So, the automation process will eliminate the error and human interface by taking full control over the operations of the mechanized equipment and providing consistency through the process control system, and strong the instrumentation built in the system.

### II. OBJECTIVES

1. To design two-wheel drive for transporting goods over short distance.
2. To analysis working of forklift machine for small scale industries.
3. To implementation of automation for eliminating human errors.
4. To uses electric power for operating this forklift which makes machine environmentally friendly and fuel efficient.
5. To reducing cost such as automation that reduces labor costs.

### III. PROBLEM STATEMENT

A critical path issue in forklift development is for two-wheeler forklift operating ability to be extended to lower lifting capacity and dimension specifically. Two-wheeler forklift lifting capacity should be increase to 70 kilograms. While maintains performance at low lifting capacity within the same strength minimum variable geometry features and the use of high torque low voltage operating motor.

#### IV. METHODOLOGY

In the designing and fabrication of two-wheel fork lift drive first collect information with the help of research papers. Then the parts which will practically fabricates first make the 3D design in the CATIA modelling software. Then with the help of actual designing calculations decides the standard parts. After this step with the help of ANSYS software analyse the forces and deformation of the fork. Then with the help of desire and safe dimensions fabricate the prototype of the project. Then testing is carried out and the result and conclusion is drawn.

#### V. 3D DESIGN OF MODEL

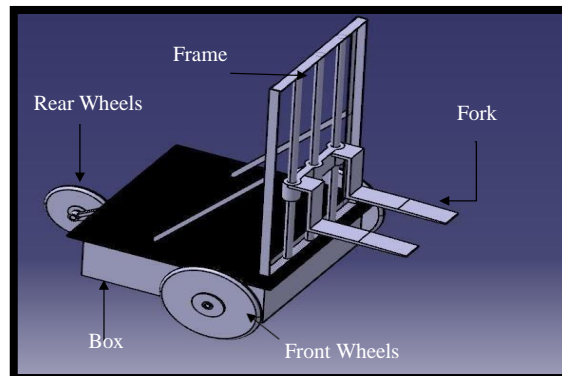


Fig. 1 3D Design of Model

In the 3D design of the model use CATIA modelling software because of its user-friendliness and various functions. Fig. 1 shows the model of the project. The parts which actually going to be fabricate are design in 3D view in this software.

#### VI. ANALYSIS OF THE MODEL

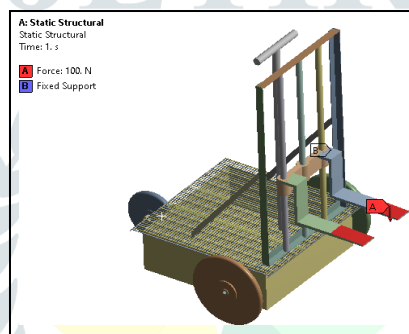


Fig. 2 Static Structural Analysis

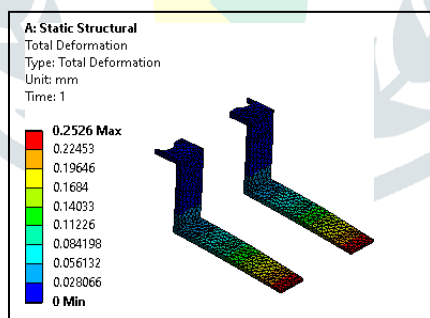


Fig. 3 Total Deformation

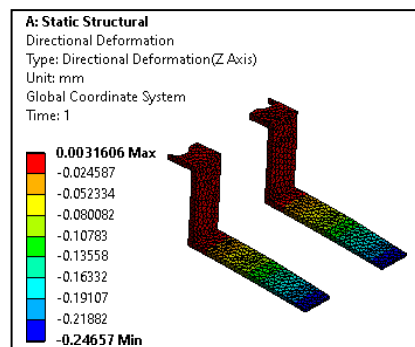


Fig. 4 Directional Deformation

In the Analysis of the two-wheel forklift machine use ANSYS as an analysis software. Fig. 2 shows the static structural analysis of the model. The fork is fix and operates with the help of guidance shafts. The load lifted by fork so, for the safe dimensions and material analyse the fork at different loading conditions. Fig. 3 shows the total deformation occurs while lifting the load. Fig. 4 shows the proper illustration of the total deformation under loading condition.

## VII. STANDARD COMPONENT

1. Lead Screw: A lead screw sometimes called a power screw or translation screw. It's used to translate turning motion into linear motion. In our project lead screw is used for lifting a fork up and down direction. Fig. 5 shows lead screw.



*Fig. 5 Lead Screw*

2. Sprocket Wheel: Sprockets are used in bicycles, motorcycles, cars, tracked vehicles, and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc. It's Manufacture by cast iron. The fig. 6 shows the sprocket wheel.



*Fig. 6 Sprocket Wheel*

3. Chain Drive: Chain drive is a type of mechanical power transmission system. In our project requirement we use bicycle chain to transmit motion. Chain drive is passing over the sprocket gear, with the teeth of gear meshing with the holes in the links of the chain. The fig. 7 shows the chain drive.



*Fig. 7 Chain Drive*

4. DC Motor: Fig. 8 shows DC motor. This motor is use in this project for adjust speed and constant or low-speed torque.



*Fig. 8 DC Motor*

## VIII. FABRICATED MODEL



*Fig. 9 Fabricated Model*

## IX. CONCLUSION

All the parts 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 size of a forklift and hence the new model is able to move through narrow passages and lift the load in a store house. Using forklift to carry load of lighter weight and making it efficient and reduce the accident's happening in warehouses due to large forklifts. In this project because of the use of automation helps in reducing and eliminating human errors which occurs in various places. Because of the use of automation, it helps in reducing human power.

## X. REFERENCES

- 1) Jian-Yi Wang, Jing-Shan Zhao, Fu-Lei Chu, Zhi-Jing Feng, Innovative design of the lifting mechanisms for forklift trucks, Mechanism and Machine Design, Dec.-2010, Volume 4, Issue 6, Pages 1892-1896
- 2) Anil Siqueira, Saif Mohammed, Avinash Kumar, Krishnamurthy H, Design and Fabrication of Battery-Operated Forklift, International Information and Engineering Technology, Dec.-2019, Volume 5, Issue 6, Pages 569-574
- 3) Lakshya Garg, Nitish Chauhan, Design of Two Wheel Automatic Electric Forklift for Industry Warehouses and Domestic Purpose, International Journal for Technological Engineering, May-2018, Volume 5, Issue 9, ISSN: 2347-4718
- 4) Ravi G. Kaithwas, Aniket A. Pattiwar, Rahul R. Ulmale, Ashish D. Wabhitkar, Two Wheel Aisle Forklift, International Journal of Engineering Science and Computing, April. 2018, Volume 8, Issue 4, Pages 17127-17131.
- 5) Ugale Sachin, Salvi Tushar, Lanjekar Sachin, Kshirsagar Prashant, Design, Development and Modelling of Forklift, International Journal of Engineering and Technology, Apr.-2016, Volume 3, Issue 4, ISSN: 2278-0181
- 6) Rajat Rajendra. Wade, Digvijay, K. Take, Mahesh. S. Deshmukh, Pranav, 3 Wheel Drive Forklift for Industrial Warehouse, International Research Journal of Engineering and Technology, Feb-2018, Volume 5, Issue 2, Pages 1351-1355 ISSN: 2395-0056.
- 7) Girbes, Leopoldo Armesto, Josep Tornero, Path following hybrid control for vehicle stability applied to industrial forklifts, June-2017, Volume 62, Issue 6, Pages 910-922
- 8) P. Naveen Kumar, J. Dinesh Kumar, Design and Analysis of Two Wheel Drive Forklift for Industrial Warehouses, International Research Journal of Engineering and Technology, ETEDM - 2018 Conference Proceedings, Volume 6, Issue 4, ISSN: 2278-0187
- 9) T. Horberry, T.J. Larsson, I. Johnston, J. Lambert, Forklift safety, traffic engineering and intelligent transport systems: a case study, Applied Ergonomics 35 (2004) 575–581.
- 10) T. A. Minav, L. Laurila, J. Pyrhönen, Energy Recovery Efficiency Comparison in an Electro-hydraulic Forklift and in a Diesel Hybrid Heavy Forwarder, Proceedings of the Power Electronics Electrical Drives Automation and Motion symposium (SPEEDAM), 2019, (Pisa, Italy)