

CAGE WHEEL LIFTER

A PROJECT REPORT

Submitted by

A SARAN	(927622BME078)
SARANRAJ D L	(927622BME079)
V VISHNUVISHAL	(927622BME103)

in partial fulfillment for the award of the degree

of

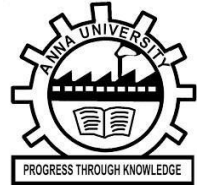
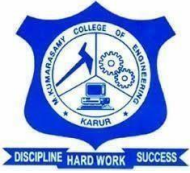
BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

M. KUMARASAMY COLLEGE OF ENGINEERING, KARUR
ANNAUNIVERSITY: CHENNAI 600025

NOV 2024



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BONAFIDE CERTIFICATE

Certified that this project report “**CAGE WHEEL LIFTER**” is the bonafide work of “**SARAN A (927622BME078), SARANRAJ DL (927622BME079), V VISHNUVISHAL (927622BME103)**” who carried out the project work during the academic year 2023 – 2024 under my supervision. Certified further, that to the best of my knowledge the work reported here in does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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This project report has been submitted for the end semester project viva voce Examination held on _____

INTERNAL EXAMINER

EXTERNAL EXAMINER

DECLARATION

We affirm that the Project titled “**CAGE WHEEL LIFTER** ” being submitted in partial fulfillment off or the End Semester Examination of **B.E. MECHANICAL ENGINEERING**, is the original work carried out by us. It has not formed the part of any other project or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Student Name

Signature

1. SARAN A

2. SARANRAJ D L

3. VISHNUVISHAL V

Name and signature of the supervisor with date

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INSTITUTION VISION & MISSION

Vision

- ❖ To emerge as a leader among the top institutions in the field of technical education.

Mission

- ❖ Produce smart technocrats with empirical knowledge who can surmount the global challenges.
- ❖ Create a diverse, fully-engaged, learner-centric campus environment to provide quality education to the students.
- ❖ Maintain mutually beneficial partnerships with our alumni, industry and professional associations.

DEPARTMENT VISION, MISSION, PEO, PO & PSO

Vision

- ❖ To create globally recognized competent Mechanical engineers to work in multi-cultural environment.

Mission

- ❖ To impart quality education in the field of mechanical engineering and to enhance their skills, to pursue careers or enter into higher education in their area-of-interest.
- ❖ To establish a learner-centric atmosphere along with state-of-the-art research facility.
- ❖ To make collaboration with industries, distinguished research institution and to become a center of excellence

PROGRAM EDUCATIONAL OBJECTIVES(PEOS)

The graduates of Mechanical Engineering will be able to

- ❖ PEO1: Graduates of the program will accommodate insightful information of engineering principles necessary for the applications of engineering.
- ❖ PEO2: Graduates of the program will acquire knowledge of recent trends in technology and solve problem in industry.
- ❖ PEO3: Graduates of the program will have practical experience and interpersonal skills to work both in local and international environments.
- ❖ PEO4: Graduates of the program will possess creative professionalism, understand their ethical responsibility and committed towards society.

PROGRAM OUTCOMES

The following are the Program Outcomes of Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design / Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life - long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life -long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The following are the Program Specific Outcomes of Engineering Graduates:

The students will demonstrate the abilities

- 1. Real world application:** To comprehend, analyze, design and develop innovative products and provide solutions for the real-life problems.
- 2. Multi-disciplinary areas:** To work collaboratively on multi-disciplinary areas and make quality projects.
- 3. Research oriented innovative ideas and methods:** To adopt modern tools, mathematical, scientific and engineering fundamentals required to solve industrial and societal problems.

Course Outcomes	At the end of this course, learners will be able to:	Knowledge Level
CO - 1	Identify the issues and challenges related to industry, society and environment.	Apply
CO - 2	Describe the identified problem and formulate the possible solutions.	Apply
CO - 3	Design / Fabricate new experimental set up/devices to provide solutions for the identified problems	Analyse
CO - 4	Prepare a detailed report describing the project outcome	Apply
CO - 5	Communicate outcome of the project and defend by making an effective oral presentation.	Apply

MAPPING OF PO & PSO WITH THE PROJECT OUTCOME

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO - 1	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 2	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 3	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 4	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3
CO - 5	3	3	3	3	2	2	2	2	3	3	2	2	3	2	3

CONTENTS

CHAPTER .NO	TITLE	PAGE.NO
	ABSTRACT	2
1	INTRODUCTION	3
2	LITERATURE REVIEW	4
3	METHODOLOGY	5
4	CONSTRUCTION	5
5	COMPONENTS AND DESCRIPTION	6
6	WORKING	8
7	2D MODELING	9
8	MATERIALS USED	10
9	CONCLUSION	11
10	COST ESTIMATION	12

ABSTRACT

In modern agriculture ,cage wheel lifter play a crucial role in enhancing efficiency. This devices is used to fix the cage wheel in tractor and gauge wheel help to change rough soil into mud and optimize planting depth and improve seed placement, ensuring uniform crop growth. The Cage Wheel Lifter is an innovative mechanical device designed to safely and efficiently handle the lifting, positioning, and maintenance of large, heavy wheel assemblies in industrial and mining applications. The Cage Wheel Lifter operates with a robust framework and hydraulic or mechanical lifting systems, allowing for controlled vertical and horizontal movements

CHAPTER -1

INTRODUCTION

The cage wheel is around 300kg which is very tough to fix the cage wheel in tractor ,it requires approximately 3 people lift and fix the cage wheel .for this we found a alternative method "cage wheel lifter". the Cage Wheel Lifter for Agriculture represents a valuable advancement in farm machinery maintenance. By automating and optimizing the process of lifting and replacing large wheels, it contributes to more efficient farm operations, increased safety for workers, and a reduction in the overall cost of maintaining agricultural equipment. This device reduces manual labor, increases productivity, and minimizes downtime during wheel replacement or maintenance.

CHAPTER- 2

LITERATURE REVIEW

Cage wheel is important traction improvement device in wet puddle soil condition. In India rice is important crop for crop production and produced first crop as well as second crop where required puddle field condition. During the field operation with machine no of losses such as trafficability of the surface layer is very poor, increased energy consumption, fuel consumption, soil hardpan, plant debris etc. The cage wheel, in particular, provides a floating effect to the power tiller in wet paddy fields, in addition to puddling the soil. Use of suitable cage wheel allow well puddle conditioned energy saving operation in wet land.

Keywords: Cage wheel, Traction, Sink

CHAPTER 3

METHODOLOGY

The development and implementation of a **Cage Wheel Lifter** involves a systematic approach that combines theoretical design principles with practical considerations in material selection, structural analysis, and operational testing. The following methodology outlines the key steps involved in designing, testing, and optimizing a cage wheel lifter, suitable for applications in industries such as agriculture, manufacturing,

CHAPTER 4

CONSTRUCTION

Place two square rod in measurement of 25 inches and side length of 15 inches .Place the square rod in the interval of 6 inches and fix two square in taper position 40 to 45 degree, form a cube in opposite side taper rods and weld rods. place jack inside cube

CHAPTER 5
COMPONENTS AND DESCRIPTION
MAJOR COMPONENTS

1. SQUARE ROD
2. NORMAL ROD
3. SHEET METAL
4. HYDRAULIC JACK

SQUARE ROD

A square rod made of mild steel is a versatile, commonly used structural material in various industries, including construction, automotive, manufacturing, and agriculture. Mild steel, also known as **carbon steel** or **low-carbon steel**, contains a relatively low percentage of carbon, typically around 0.05% to 0.25%..

NORMAL ROD

A normal rod made of mild steel refers to a straight, cylindrical piece of mild steel that is typically used in a wide range of applications due to its excellent combination of strength, ductility, and cost-effectiveness.

SHEET METAL

Sheet metal refers to thin, flat pieces of metal that are typically produced by rolling or hammering metal into thin sheets. These sheets are commonly used in a wide range of industries, including construction, automotive, aerospace, electronics, and manufacturing, due to their versatility, durability, and ease of fabrication.

HYDRAULIC JACK

A hydraulic jack is a mechanical device that uses hydraulic force to lift heavy loads. It is an essential tool in automotive repair, construction, and industrial maintenance, where lifting heavy objects such as vehicles, machinery, and building components is required. Hydraulic jacks are known for their ability to lift large weights with relatively little manual effort, utilizing the principles of hydraulic pressure to generate force.

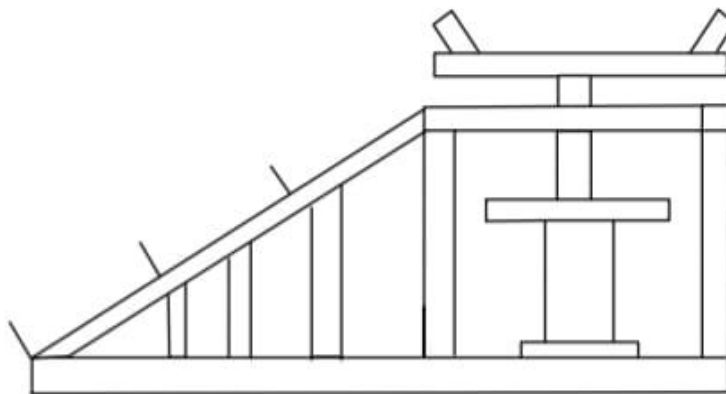
CHAPTER 6

WORKING

Place the cage wheel lifter on one side of rear wheel, push the cage wheel to the taper side lifter next adjust the jack to required height fix wheel with nut and bold . Reduce the height of jack and take gauge wheel lifter do same process on the other side.

CHAPTER 7

2D MODELING



CHAPTER 8
MATERIALS USED

S. NO	DESCRIPTION	QUANTITY	MATERIAL
1	SQUARE ROD	5	MILD STEEL
2	NORMAL ROD	3	MILD STEEL
3	SHEET METALS	4	MILD STEEL
4	JACK	1	

CHAPTER 9

CONCLUSION

In the context of agriculture, the cage wheel lifter offers significant advantages in managing the lifting and handling of heavy equipment, tools, or containers typically used in farming and livestock management. The device can be particularly useful in tasks like lifting feed bins, irrigation components, and even in the handling of large cylindrical hay bales or other agricultural products. By utilizing its rotating wheel system and adjustable lifting arms, the cage wheel lifter helps distribute weight evenly, which reduces strain on both the equipment and workers. As agriculture increasingly adopts mechanized solutions to improve productivity, the cage wheel lifter stands out as an important tool for streamlining operations, reducing worker fatigue, and enhancing overall farm safety.

CHAPTER 10
COST ESTIMATION

S..NO	DISCRIPTION	COST Rs:
1	SQUARE ROD	500
2	NORMAL ROD	200
3	SHEET METAL	150
4	JACK	1200
5	TOTAL	2100

