

UNIVERSITI TEKNOLOGI MARA

**DESIGN, ANALYSIS AND
FABRICATION OF MINI CRANE**

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ABSTRACT

This mini crane is a compact and versatile equipment designed to ease the challenges faced in small-scale construction and material handling operations. This project addresses the need for a cost-effective, portable, and easy-to-use lifting solution that can be deployed in confined spaces or areas with limited access. The primary objective of this project is to design and fabricate a mini crane that can safely and efficiently lift and move loads, while being operated by a single user. The development process will involve a comprehensive design process that includes conceptual design and structural analysis. The design will incorporate a user-friendly control system to ensure ease of operation and maneuverability. The fabrication process will utilize durable materials and manufacturing techniques to ensure the crane's reliability and longevity. The expected results of this project include the development of a mini crane that can effectively address the needs of small-scale construction, and material handling tasks. The crane's compact size, high lifting capacity, and user-friendly design are expected to improve productivity, reduce manual labor, and enhance safety in the workplace. In conclusion, the mini crane project aims to provide a practical solution to the challenges faced in small-scale material handling operations.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Over time, the lifting industry has undergone substantial evolution to improve safety and efficiency when lifting heavy loads, moving from human handling to the current use of crane. In the past, manual lifting required physical effort which exposed the worker to the risk of injury due to improper techniques. The demand for safer and more efficient lifting solutions emerged with the advancement of industry, and this led to the invention of crane in the early century.[1]

The history of cranes goes back to ancient times, where big loads were lifted by pulley systems. Cranes were further developed and used for construction. The invention of crane then advanced with the creation of treadwheel crane.[2] The first hydraulic crane was created thanks to Blaise Pascal's hydraulic technology. Crane construction changed from wood to iron during the Industrial Revolution, when the first cast iron crane was constructed.[3] Nowadays, modern cranes are built with superior materials, mostly iron, using hydraulic principles, and can carry greater weights. These days, cranes are essential in many different industries.[4]

Despite their advantages, the modern cranes we see nowadays present several drawbacks in terms safety and work efficiency. High maintenance costs, lengthy installation times, and substantial space need are some of these drawbacks. Furthermore, mishandling cranes can cause severe accidents. Therefore, operators need to have proper training and knowledge to operate the complex machine. Additionally, one of the main concerns of these modern cranes are the maneuverability. Due to its large size, most of the cranes are difficult to assemble, and hard to be used in a smaller construction site.[5]

Through comprehensive research, this study aims to develop a mini crane that can overcome those challenges faced by conventional cranes. By focusing on operator's safety, efficiency, and maneuverability, this project aims to enhance productivity and safety in smaller workplaces or construction sites efficiently and ergonomically.