



HEAVY LIFTING TROLLEY FOR OIL DRUM



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HEAVY LIFTING TROLLEY FOR OIL DRUM

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A thesis submitted
in fulfillment of the requirements for the degree of
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Honours**



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2021

DECLARATION

I declare that this thesis entitled “Heavy Lifting Trolley For Oil Drum” is the result of my research except as cited in the references. This thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Manufacturing Engineering Technology (Process and Technology) with Honours.

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Date : 17/01/2022



DEDICATION

Dedicated to

My honourable father, Hadrawi Bin Mohd Arip,

My lovely mother, Faridah Binti Dangka,

My supportive brothers, Waqiyuddin Hilmi Bin Hadrawi and Fakhruddin Nazmi Bin

Hadrawi,

My sweet sister, Qurratu Aini Syafiqah Binti Hadrawi, Khairunnisa Zulaikha Binti

Hadrawi, Siti Asiah Khalisyah Binti Hadrawi, Harlina Shuhadah Binti Hadrawi and

Uddaimatunnur Farhana Binti Hadrawi.

Thank you very much.

ABSTRACT

This thesis presents the heavy lifting trolley for oil drum. This heavy lifting trolley for oil drum is a mechanical device used to securely clamp, lift and transport cylindrical modules such as steel drums, drums, plastic drums, and fibre drums. Heavy-duty oil drums are typically filled with lubricants, liquids, or chemicals intended for use as operating supplies or raw materials in industrial applications. Since heavy lifting devices used in industrial manufacturing, the objective of the project is to focus on the problem and the need of the user (worker). The products presented in this thesis will add value to the target group, as it is based on a research of user experience. The design process is based on existing journals, observations, studies, benchmarks, and literature reviews.



ABSTRAK

Tesis ini membentangkan troli angkat berat untuk tong minyak. Troli pengangkat berat untuk tong minyak adalah alat mekanikal yang digunakan untuk mengepam, mengangkat dan mengangkut modul silinder dengan selamat seperti tong keluli, tong dram, tong plastik, dan tong serat. Drum minyak tugas berat biasanya diisi dengan pelincir, cecair, atau bahan kimia yang dimaksudkan untuk digunakan sebagai bekalan operasi atau bahan mentah dalam aplikasi industri. Oleh kerana alat pengangkat berat digunakan dalam pembuatan industri, objektif projek ini adalah untuk menumpukan perhatian pada masalah dan keperluan pengguna (pekerja). Produk yang disajikan dalam tesis ini akan memberi nilai tambah kepada kumpulan sasaran, kerana berdasarkan kajian pengalaman pengguna. Proses reka bentuk adalah berdasarkan jurnal, pemerhatian, kajian, penanda aras, dan tinjauan literatur yang ada.



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LIST OF SYMBOLS AND ABBREVIATIONS

A	-	Area
F	-	Force
GMAW	-	Gas Metal Arc Welding
GTAW	-	Gas Tungsten Arc Welding
MIG	-	Metal Inert Gas
P	-	Pressure
SMAW	-	Shielded Metal Arc Welding
TIG	-	Tungsten inert gas



CHAPTER 1

INTRODUCTION

1.1 Background

A lifting trolley is a transport device that is used to transport heavy loads from one location to another. Hand trolleys are commonly used to convey finished goods or raw materials in most industries. Trolleys are such an extremely helpful material handling device for moving both light and heavy things. These improve productivity in most businesses by helping employees to load, carry, and find things rapidly and efficiently. As a result, operating expenses are reduced, and worker safety is improved. There are various types of trolleys, and the one selected is usually based on the type of material it can transport (Shubham et al., 2018).

There's a various type of trolleys which is drum handler (Figure 1.1) and drum lifter (Figure 1.2) A drum handler and drum lifter have a same function which is used to grab, lift, and carry cylindrical modules such as steel drums and barrels in a safe and efficient way. The drum handler is often used to transport a 55-gallon drum container. However, there are devices that can handle both small and large-capacity drums. Drums and barrels can be lifted, stacked, moved, weighed, poured, and stacked using this equipment. Certain drum handler designs can also be used to carry tires. Heavy-duty metals with a smooth finish are commonly used in manufacturing industries (Harari & Powar, 2021).



Figure 1.1 Drum Handler



Figure 1.2 Drum Lifter

Source Figure 1.1: <https://www.denios-us.com/shop/handling-equipment-accessories/drum-handling/lifting-equipment/>

Source Figure 1.2: <https://www.indiamart.com/proddetail/drum-lifter-trolley-2678672548.html>

This device widely used to move physical objects in a variety of industries. Those who sort and stock products in retail businesses restock often use trolleys. While done appropriately, a trolley helps prevent back injuries and other health problems that might occur when lifting and transporting big objects (Amir et al., 2020).

A heavy lifting trolley for oil drums is a mechanical device that grips, lifts, and transports cylindrical modules such as steel drums, containers, plastic drums, and fibre drums. This equipment is used in the chemical and petroleum industries, as well as industries that enable cylindrical modules that need to be stored.

In manufacturing industries, the method of transforming raw materials or components into finished products using machines, human labour, equipment, and chemical refining has always been used for decades. Manufacturers can take advantage of

economies of scale by using efficient production processes to produce more units at a lower cost. Manufacturing is a value-adding practice that allows companies to market manufactured goods at more than the expense of the raw materials they used.

Industrial sectors generate new items by working with goods, materials, or substances. Transformations might be physical, chemical, or mechanical. Manufacturers frequently have plantations, mills, or factories that manufacture consumer products. In the production process, machines and machinery are often used. While certain products can be made by hand, this is not always the case.

1.2 Problem Statement

Heavy duty lifting trolley is a kind of lifting equipment that used for moving drums from one place to another. This new trolley can reduce the consumption of a lot of energy. Most of Industrial oil drum weight can reach until 250 kg when full or more. With oil drum weights potentially being 3 times heavier than human's weight, these containers pose a severe health and safety risk to people who handle them. The industrial activities included physical handling tasks that required the workers to lift and handle big things on a regular basis.

The equipment of industrial, which are the company's items, are examples of the things. Although the company has given equipment such as a forklift to raise large panels, there are still numerous panels that cannot be moved by the equipment. It is due to their sizes and the space provided in the warehouse. For companies that use barrels and drums within their operation, drum handling safety should be an important part of work procedure. Employers must look at the risks of loading and unloading heavy drums/barrels and put sensible health and safety measures in place to avoid the need for hazardous manual handling (Kamat et al., 2017).

1.3 Objective

This project initiated by focusing on few objectives to be achieved which are as listed:

- i. To study the concepts of lifting trolley based on real problem and the need of the user
- ii. To design a heavy lifting trolley that suitable for industrial work
- iii. To produce a heavy lifting trolley that make it easy to transport a heavy load

1.4 Scope

This project focuses on the manufacturing industry that uses oil barrel lifting operation. The design and production are particularly focused on heavy lifting trolleys for oil barrels that prioritize user safety. The concept of the design will be generated, and the best concept will be explained in detail. The software will be run for this project is solid work software to enhance the design of the heavy lifting trolley. Meanwhile, the material and parts have been chosen for the heavy lifting trolley for oil drum which is toe hydraulic jack, wheel and sheet metal and it will be prepared. Ascertain that the prototype developed satisfies the requirements of users and achieves the objectives.

CHAPTER 2

LITERATURE REVIEW

This chapter will cover the process involved in the development of the overall enhancement on heavy lifting trolley in achieving the project objectives. The information collected will become an additional source of project research and development projects to make them more successful. To understand the research related to this project, some literature reviews have been conducted.

2.1 Introduction

The heavy lifting trolley idea is based on how the concept would be developed into an interesting device that is simple, easy to use, and efficient, including being an add-on service for the hydraulic system. It is because the concept was based on technology, it was necessary to obtain user feedback. The concept is built on current items with slightly different design (Amir et al., 2020).

Heavy lifting trolley is used for a variety of tasks such as hauling, tilting, lifting, loading, and unloading. Drum barrels are handled manually in small enterprises or workshops, which takes more time and requires more workers. Manually handling a drum without the use of any equipment is dangerous. The moving or sustaining of a cargo by one or more workers is known as manual handling. It includes that lifting, holding, putting down, pushing, tugging, carrying, or transporting a burden are all activities that fall under this category. A load can be an inanimate object (boxes, tools, etc.). Manual handling is common in practically all workplaces (factories, warehouses, building sites, farms, hospitals, offices etc.). Lifting boxes in a packaging line, managing building materials,

pushing carts, dealing with patients in hospitals, and cleaning are all examples of this (Garghate & Ninawe, 2015).



Figure 2.1: Concept of heavy lifting trolley

Source:

https://drc.uc.edu/bitstream/handle/2374.UC/732289/MET2007_Bohland_Christopher.pdf?sequence=1

2.2 **Function of Heavy lifting trolley handling equipment.**

Material handling is the productivity of manufacturing and distribution networks. In every industrial or distribution system, it is a key role. Handling equipment is used to increase production, control expenses, and enhance productivity. Warehouse management can utilize a variety of methods to establish how efficient material-handling equipment is used in any given operation. This category of equipment includes anything that has to do with the transport, storage, control, and protection of materials, goods, and products through the manufacture, distribution, consumption, and disposal processes. It's also known as the mechanical equipment that makes up the entire system. Storage and handling equipment, engineered systems, industrial vehicles, and bulk material handling are the four primary kinds of material handling equipment (Heragu & Ekren, 2015).

2.2.1 Principles of material handling

The principle of material handling is to facilitate the work and prioritize the safety of users. Some injuries such as lower back injuries are a serious health threat to users who use manual handling. In addition, this material handling principle is to control costs such as treatment costs in the event of an accident and minimize time in material handling in today's competitive and global world. The creation of methods that improve and simplify the work process is supported by effective material handling procedures.

2.2.1.1 Types of material handling principles

Table 2.1: Types of material handling equipment

No.	Type of principle	Description
1	Planning principle	All material handling should be the outcome of a good strategy in which the demands, performance targets, and functional.
2	Standardization principle	The material handling standardization principle holds that all procedures, equipment, controls, and software should be standardized within the limits of reaching performance goals.
3	Work principle	Material handling work should be minimized without compromising productivity or the degree of service required by the operation, according to the working principle.
4	Ergonomic principle	To maintain safe and successful operations, human capabilities and limits must be acknowledged and respected in the.

No.	Type of Principle	Description
5	Unit load principle	At each level of the supply chain, unit loads must be appropriately sized and structured to meet the material flow and inventory requirements.
6	Space utilization principle	It is important to organize and clear working areas, optimize density in storage areas without compromising accessibility and flexibility and employ overhead space.
7	System principle	All material movement and storage processes should be integrated to establish a coordinated operational system, according to the system concept.
8	Automation principle	All material handling procedures should be automated or automated wherever possible. This increases operating efficiency, responsiveness, stability, and predictability while reducing operating expenses and potentially dangerous human's labour.
9	environmental Principle	When designing or selecting alternative material handling equipment and systems, the environmental concept of material handling considers that all environmental impacts and energy consumption should be considered.
10	Life cycle cost principle	A detailed economic study should take all material handling systems and the associated systems into considerations throughout the life cycle (Carver, 2013).