UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND MANUFACTURING IMPROVEMENT OF RIVER TRASH COLLECTING SYSTEM (RTCS) SCISSOR LIFTER

MOHAMAD SYAFIQ BIN BAKRI
B091910019

BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (BMMV) WITH HONOURS

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Mohamad Syafiq Bin Bakri

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MOHAMAD SYAFIQ BIN BAKRI

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in fulfillment of the requirements for the degree of
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DECLARATION

I declare that this "DESIGN AND MANUFACTURING IMPROVEMENT OF RIVER TRASH COLLECTING SYSTEM (RTCS) SCISSOR LIFTER" is the result of my own research except as cited in the references. The Choose an item. has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

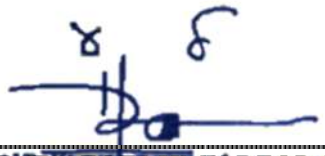
Signature : 

Name : MOHAMAD SYAFIQ BIN BAKRI

Date : 28 Januari 2023

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 Mechanical Engineering Technology (BMMV) with Honours.

Signature : 

Supervisor Name : TS. MOHD DAIN FAHMY BIN ROSLEY

Date :

DEDICATION

This final year project is dedicated my supervisor, Ts. Mohd Idain Fahmy Bin Rosley, and my co-supervisor, for their endless hours of reflection, reading, encouraging, and, most importantly, patience throughout the project. This project is also dedicated to my parents, who are the motivating and supporting my efforts to complete the project successfully.

ABSTRACT

River polluted water has gotten a lot of attention in recent years, and it continues to be a major source of concern around the world. The deterioration of water quality is primarily linked to the issue of population development and city expansion. This is a threat to human and ecological health, as well as the supply of drinking water and economic development. Human activities that provide a financial benefit to society have harmed the river's water quality indirectly. Water pollution in Malacca River is caused by a variety of sources, including waste pollutants and excrement waste. It will contaminate the river's water and degrade its quality. Local inhabitants in Alor Gajah and Melaka Sentral, as well as the state government, have backed the problem that the river's water quality has deteriorated substantially due to waste pollution. A cleaning boat is currently being used to remove the debris in Malacca River. Only one watercraft driver and another collector are required for this technique. To avoid a clog, the collector collects the large waste into the receptacle. The waste will be collected once a day, and the entire process should take more than 3 hours. In this project, the problem and failure of the River Trash Collecting System (RTCS) from the previous project will be identified. From the problems and failures, the solution for the problems that has been faced need to be made to gain the improvements of the River Trash Collecting System (RTCS). The field test also will be tested at Malacca River to make the River Trash Collecting System (RTCS) functional well. The improvements that want to be made is expected to have a lightweight, high strength, and fulfill all PPSPM concerns and requirements.

ABSTRAK

Air sungai yang tercemar telah mendapat banyak perhatian sejak beberapa tahun kebelakangan ini, dan ia terus menjadi punca kebimbangan utama di seluruh dunia. Kemerosotan kualiti air dikatakan berkaitan dengan isu pembangunan penduduk dan perluasan bandar. Ia merupakan satu ancaman kepada kesihatan manusia dan ekologi, serta bekalan air minuman dan pembangunan ekonomi. Aktiviti manusia yang mendatangakan manfaat kewangan kepada masyarakat telah menjejaskan kualiti air sungai secara tidak langsung. Pencemaran air di Sungai Melaka berpunca daripada pelbagai sumber antaranya pencemaran sisa dan sisa najis. Ia akan mencemarkan air sungai dan merendahkan kualitinya. Penduduk tempatan di Alor Gajah dan Melaka Sentral, serta kerajaan negeri, menegaskan bahawa masalah kualiti air sungai itu merosot dengan ketara akibat pencemaran sisa. Sebuah bot pembersihan sedang digunakan untuk mengalihkan sisa pepejal di Sungai Melaka. Hanya seorang pemandu bot dan seorang lagi pengumpul sisa pepejal diperlukan untuk teknik ini. Untuk mengelakkan tersumbat, pemungut mengumpul sisa pepejal yang besar ke dalam bekas. Sisa pepejal akan dikumpulkan sekali sehari, dan keseluruhan proses harus mengambil masa lebih daripada 3 jam. Dalam projek ini, masalah dan kegagalan "River Trash Collecting System (RTCS)" daripada projek sebelum ini akan dikenalpasti. Daripada masalah dan kegagalan tersebut, penyelesaian bagi masalah yang dihadapi perlu dibuat bagi meningkatkan penambahbaikan "River Trash Collecting System (RTCS)". Ujian lapangan juga akan dijalankan di Sungai Melaka untuk menjadikan "River Trash Collecting System (RTCS)" berfungsi dengan baik. Penambahbaikan yang ingin dilakukan diharap mempunyai kekuatan yang tinggi, ringan, dan memenuhi semua kritiria dan keperluan PPSPM.

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LIST OF SYMBOLS AND ABBREVIATIONS

RTCS	-	River Trash Collecting System
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
DOE	-	Department of Environment
PPSPM	-	Perbadanan Pembangunan Sungai dan Pantai Melaka
MIG	-	Metal Inert Gas
CAD	-	Computer-aided design
FEA	-	Finite element analysis
SLS	-	Selective laser sintering
MAG	-	Metal Active Gas
GMAW	-	Gas metal arc welding
3D	-	3 Dimension
GdZn	-	Gadolinium--zinc
mm	-	Milimeter
“	-	Inches
°	-	Degree
EDM	-	Electrical Discharge Machine

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CHAPTER 1

INTRODUCTION

1.1 Background

Malacca is a historical tourism attraction that was designated as a UNESCO World Heritage Site on July 7, 2008 (UNESCO Official Portal, 2015). (Bernama Official Portal, 2008). Malacca is interestingly regarded as one of the states that gives the most economic value to the country through tourism (Tourism Malaysia Official Corporate Website, 2015). Malacca state is located at N2°19'35.3" and E102°20'44.5", according to the World Geodetic System 1984 or WGS84 (Department of Survey and Mapping Malaysia, 2009). Negeri Sembilan to the north, Pahang to the east, Johor to the south, and the sea of the Strait of Malacca to the west surround the state (Melaka State Government Official Portal, 2015). Alor Gajah, Jasin, Melaka Tengah, or Malacca Central, are the three districts that make up Malacca's 1,650 square kilometres (Melaka State Government Official Portal, 2015). To put it another way, Malacca is reachable by air or land. In 2010, there were 821,110 people in the city, which climbed to 830,900 in 2011. (Melaka State Government Official Portal, 2015). To put it another way, the population of Malacca has exploded, particularly in the Central District, where the majority of the city's citizens are looking for work. The majority of fascinating locations to visit, for example, are in the city or Malacca Central, which has resulted in greater career opportunities for locals as well as residents from neighbouring states. As a result, Malacca is a thriving city. As a result, Malacca is crammed with individuals who come to work and stay for an extended amount of time.

Malacca state has seen rapid growth, which has benefited the local population much. However, the growth has unintentionally resulted in a number of environmental challenges and problems, such as river pollution (Nasbah, 2010). River pollution impacts local communities not just when they go fishing, swimming, or washing their clothes, but also when they smell awful, see unpleasant scenery, or have illness spread (Nasbah, 2010) (Jabar, 2010). (Hua, 2014). According to a 2012 assessment from Malaysia's Department of Environment (DOE), 195 of 473 rivers are contaminated, including the Malacca River. The Malacca River, on the other hand, is significantly contaminated but not yet classified as very polluted. As a result, if this issue is not treated seriously, Malacca may face a wider range of challenges, including in the tourism business. According to Hua and Kusin (2015), diverse human activities are carried out along the Malacca River, commencing with agricultural and livestock operations upstream, factories and settlement activities in the middle stream, and commercial and settlement activities downstream. As a result, the focus of this project will be on minimizing floating waste and debris on the Malacca River's surface.

1.2 Problem Statement

The significance of rivers to human life and development cannot be emphasised. Rivers are significant for the human race because they are not just major biodiversity hotspots and habitats for endangered species. The river is most important for drinking water, human economy, agriculture, transportation, and energy supply. However, most rivers are now polluted by floating debris, oils and hydrocarbons, industrial waste, and other pollutants.

This is not a new occurrence in Malacca, which has had major water pollution issues that have resulted in the extinction of aquatic species along the Malacca River (Sinar

Harian Online, 2016; Hua, 2015; Metro Online, 2015; Daneshmend et al., 2011). In 2008, UNESCO designated Malacca State as a World Heritage Site (UNESCO, 2016), and it has since become a world historical tourism destination for the country.

Melaka government must take care of water pollution in the Malacca River since one of the tourist attractions is the Melaka River Cruise because Melaka is reliant on the tourism industry. The cruise will take visitors on a tour of Melaka. Unfortunately, due to tainted water from plastic, food and beverage containers, and human clothing, the stench of the Malacca River is particularly unpleasant. The scent is also caused by industrial waste such as oil, chemicals, and radioactive waste, which has caused the death of the fish.

Figure 1 Malacca River Cruise

Figure 2 Death fish due to the contaminated water

The River Trash Collecting System (RTCS) was created with the goal of reducing pollution in the area. River Trash Collecting System (RTCS) has the main function in removing the floating trash, debris and dead fishes from the surface of the river. Size for the RTCS can be customized based on the customer's requirements and demands. The RTCS Top Frame or The Skeleton has been equipped with the glider which is the low drag pontoon to be able floating the RTCS Top Frame along the Malacca River. The RTCS Scissor Lifter has been assemble to the RTCS Top Frame which the mechanism is the actuator will push or pull the scissor lifter to sink or lift the RTCS Main Body Frame. The RTCS Top Frame has been equipped with the deck and the deck have two doors that function to easy the operator when discharging the trash that has been trap in the RTCS Main Body Frame.

1.3 Research Objective

The primary aim of this project is to reduce water pollution by design and fabricate the River Trash Collecting System (RTCS) on how to develop a lightweight, high strength material. Specifically, the objectives are as follows:

i. To redesign and simplify River Trash Collecting System (RTCS) Scissor Lifter as to reduce weight

ii. To analyse the River Trash Collecting System (RTCS) Scissor Lifter as to increase strength

iii. To fabricate the new River Trash Collecting System (RTCS) Scissor Lifter

1.4 Scope of Research

The scope of this research are as follows:

i. To redesign and simplify the River Trash Collecting System (RTCS) Scissor Lifter as to reduce weight using SOLIDWORKS

ii. To analysis and the River Trash Collecting System (RTCS) Scissor Lifter as to increase strength using SOLIDWORKS

iii. To fabricate the new River Trash Collecting System (RTCS) Scissor Lifter using conventional and advance manufacturing method