



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF DRAINAGE SYSTEM WITH WATER TREATMENT

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Robotic and Automation) with Honours.

by

MOHD HAZWAN BIN ZULKEFLY

FACULTY OF MANUFACTURING ENGINEERING

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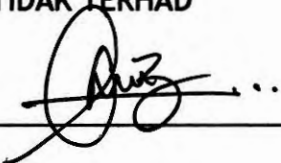
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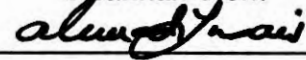
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Disahkan oleh:



Penyelia PSM

AHMAD YUSAIRI BIN BANI HASHIM
Pensyarah Kanan
Fakulti Kejuruteraan Pembuatan
Universiti Teknikal Malaysia Melaka

Alamat Tetap:

No. 17 Lrg Sama Gagah,

18D Taman Teluk Gedung Indah,

42000 Pel Klang Selangor.

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) with Honours. The member of the supervisory committee is as follow:

(Signature of Supervisor)

.....

(Ahmad Yusairi Bin Bani Hashim)

ABSTRACT

Development of drainage system with water treatment is a fiction created solely to reduce costs and problems faced by farmers in planting rice for their income. The first section introduces the general concepts of fluid Mechanics will be used to implement this design. And the introduction of the main problems faced by the farmers as well as measures that will be used to solve this problem roughly. This section also describes the objectives, scope, problems encountered and the method used to solve the problem. Subsequently, studies were (scientifically) will be displayed. This section will discuss in more detail about the study that was done. In this section it will explain in detail about the formula used to solve design problems and the current strength of the flow rate to determine the time taken to deliver a single parcel of land for rice planting. In addition, the construction methods used to produce a drainage system with water treatment and how to solve design problems. How is using Solid Works 3D software. Manufacturing process involved in this project where the drainage system with water treatment station with diesel fuel is placed on the board to activate this system. Finally ready for the overall design of this system and after adding these improvements will be presented in the spaces followed by conclusions and recommendations.

ABSTRAK

Pembangunan sistem drainase dengan pemprosesan air adalah rekaan yang dibuat semata-mata untuk mengurangkan kos dan permasalahan yang dihadapi oleh petani dalam menanam padi untuk pendapatan mereka. Bahagian pertama memperkenalkan konsep-konsep umum Mekanik bendalir ini akan digunakan untuk melaksanakan rekabentuk ini. Dan pengenalan permasalahan utama yang dihadapi oleh para petani serta tindakan yang akan digunakan untuk menyelesaikan masalah ini dengan kasar. Bahagian ini juga menggambarkan tujuan, ruang lingkup, masalah yang dihadapi dan kaedah yang digunakan untuk menyelesaikan masalah. Selanjutnya, kajian adalah (saintifik) akan dipaparkan. Bahagian ini akan membincangkan lebih terperinci mengenai kajian yang dilakukan. Pada bahagian ini akan menjelaskan secara terperinci mengenai formula yang digunakan untuk menyelesaikan masalah reka bentuk dan kekuatan saat ini laju alir untuk menentukan masa yang diperlukan untuk memberikan sebidang tanah tunggal untuk penanaman padi. Selain itu, kaedah pembinaan yang digunakan untuk menghasilkan sistem drainase dengan pemprosesan air dan bagaimana menyelesaikan masalah desain. Bagaimana menggunakan SolidWorks software 3D. Proses pembuatannya yang terlibat dalam projek ini dimana sistem drainase dengan stesen pemprosesan air dengan bahan bakar diesel diletakkan di papan untuk mengaktifkan sistem ini. Akhirnya siap untuk desain keseluruhan sistem ini dan setelah menambah perbaikan ini akan disajikan dalam ruangan dilanjutkan dengan kesimpulan dan cadangan.

DEDICATION

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Last but not least, thank you very much to all my fellows friends, which have been very generous in their support of my academic pursuits and have contributed ideas, feedback and advice throughout my project development period.

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CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter is about to introduce the research project. This project is the study and development of the concept of water drainage system from the dam to the paddy fields. Prior to this drainage system through the rice fields from water catchment areas through the manual method which requires farmers to enter it manually using the tap water is relatively large and heavy. so the results of the study and development of this concept will help the farmers to facilitate them in manually drainage system since the time immemorial, and it can help farmers who were aged in their ease the burden for lifting large and heavy pipe, because it all done automatically. The study of this project is to state the problem that occurred during development, the purpose of this project and results are expected at the end of the semester. This project is the development of irrigation system water to the rice fields of previous systems based on the passage of time and technology at present, this will help the farmers in their daily affairs, and it will modernize the system of drainage water into the paddy field at present. Because before this the farmers had to carry a relatively large pipe and had to wait such a long time for a paddy field was filled with air.

1.2 Introduction

Fluid mechanics occupies an important place in modern science and engineering. It forms one of the foundations of aeronautics and astronautics, mechanical engineering, meteorology, marine engineering, civil engineering, bioengineering and in fact, just about every scientific or engineering field.

If one casually glances around, most things seem to be solids, but when one thinks of the oceans, the atmosphere and outer space it becomes rather obvious that a good portion of the earth's surface and of the entire universe is in the fluid state. Aside from scientists' interest in the nature of the universe (which consists mostly of gas), the engineer's interest in devices, or tool that doesn't have some fluid hidden in it somewhere and some fluid mechanizes. Aircraft and ships move through fluids. The atmosphere and the weather are governed by the dynamic of fluid. All machines must be lubricated, and the lubricant is a fluid. Even the basic concepts of fluid dynamic still apply.

Fluid mechanics is that discipline within the broad field of applied mechanics that is concerned with the behavior of liquids and gases at rest or in motion. It covers a vast array of phenomena that occur in nature (with or without human intervention), in biology, and in numerous engineered invented, or manufactured situations. There are few aspects of our lives that do not involve fluids, either directly or indirectly.

One of several factors that distinguish fluids from solids is their response to compression, or the application of pressure in such a way as to reduce the size or volume of an object. A solid is highly no compressible, meaning that it resists compression, and if compressed with a sufficient force, its mechanical properties alter significantly. For example, if one places a drinking glass in a vise, it will resist a small amount of pressure, but a slight increase will cause the glass to break.

Fluids vary with regard to compressibility, depending on whether the fluid in question is a liquid or a gas. Most gases tend to be highly compressible though air, at low speeds at least, is not among them. Thus, gases such as propane fuel can be placed under high

pressure. Liquids tend to be not compressible unlike a gas, a liquid can be compressed significantly, yet its response to compression is quite different from that of a solid a fact illustrated below in the discussion of hydraulic presses. To understand fluids, it is best to begin by contrasting their behavior with that of solids. Whereas solids possess a definite volume and a definite shape, these physical characteristics are not so clearly defined for fluids. Liquids, though they possess a definite volume, have no definite shape a factor noted above as one of the defining characteristics of fluids. As for gases, they have neither a definite shape nor a definite volume.

One way to describe a fluid is "anything that flows" a behavior explained in large part by the interaction of molecules in fluids. If the surface of a solid is disturbed, it will resist, and if the force of the disturbance is sufficiently strong, it will deform as for instance, when a steel plate begins to bend under pressure. This deformation will be permanent if the force is powerful enough, as was the case in the above example of the glass in a vise. By contrast, when the surface of a liquid is disturbed, it tends to flow.

1.3 Problem Statement

Drainage system is the new system to help farmers to facilitate their daily business in agriculture, it also will make it easier to take care of water into the cultivate rice. If we look at the point now, the water system into and out from the field still need to use a large pipe and forced to bear by farmer at time nurture process. In this project the business to take in and out the water from the dam will be done automatically.

1.4 Objective

The main objectives of this project are:

- i. To develop the drainage system.
- ii. To develop the water treatment module.

1.5 Scope of Project

- i) The scopes of the project only focus on development the drainage system.
- ii) Development water treatment module for increase the productivity.

1.6 Expected Result

At the end of the project, expected to be the problems faced by farmers in their drainage system will be overcome and thus to modernize the agricultural system in this country. I will also learn the consequences of Fundamentals of fluid mechanics and the resulting design will enhance and adapt the knowledge they have learned while at university. If everything goes smoothly the project will be submitted to the department of agriculture to be patent and applied across the paddy fields in the country.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

This chapter gives an overview of the various types of drainage are appropriate to place the pipes to be loaded on the walls of water reservoirs, types and applications. It briefly describes the mechanism in accordance with the diameter, length and type of pipe that will be used to better explain the results of the project. This section also introduces the concept of fluid mechanics, the study of the concept design, and implementation of various types of suitable drainage system is in place today. Source literature review usually refers to information obtained from authoritative sources such as books, articles, association, article published or other sources where appropriate. Through literature review to learn the concepts to do the project. Literature review is an introduction to the drainage, and design appropriate to place the reservoir system provided by the government to fit the concept, and design an appropriate water flow rate. Also the theory can be applied to the production of project implementation and research. The design and material selection should be reviewed to assist in the development process. Processes and related processes in this project should be reviewed.

2.2 Drainage System

2.2.1 History of Drainage

The earliest Drainage works in Europe, during the classical era, were principally concerned with surface drainage and the abatement of public nuisances. Ancient Rome was one of the earliest cities to develop an extensive sewer system. However, most residences were not connected to Rome's great underground drains. Public sanitation centered on private or public latrines and privies, and large amounts of ordure found its way into street gutters, where it was irregularly washed into the public sewers by the action of rain or irrigation. The circumstances were even worse in European cities of the medieval and early modern world, where civil engineering lagged behind that of the Romans. Urban environments were remarkably filthy and unhealthy. In general, underground sewers were designed to carry storm water rather than human and household wastes. Street gutters were characteristically choked with human and animal excrement, and cities in poorly-drained landscapes festered in foul mud. Without any available scientific knowledge of hydraulics or topographical science, efforts to improve drainage or sewerage systems were universally piecemeal and ineffective. In fact, no marked progress was made in drainage and sewerage systems in Europe from the classical era to the early 1830s.

The beginning of the modern era of drainage and sewerage systems began in Paris. As early as 1808, a comprehensive study was undertaken to determine the sewerage needs of the city. There were 14½ miles of drains in Paris in 1808, but only about 10½ miles were added by 1832. In that year, an epidemic of cholera in Paris led authorities to make a topographical survey of the city in preparation for a planned system of drainage. The system was to be based on topographical features rather than administrative boundaries, which avoided many delays encountered in subsequent efforts to modernize drainage in London, and even some American cities. The system construction begun in Paris in 1833 concerned drainage, and not house sewerage, and therefore has received less attention than some later efforts elsewhere. Many of the low-lying streets along the Seine were

raised above the level of any expected flood; old drainage sewers were reconstructed or abandoned; and the cross-section of streets changed from concave to convex. For the ease of cleaning by workmen, the new sewers built in Paris after 1833 were made six. Or higher, so the workmen could stand up in them. These large sewers were intended to remove street refuse as well as rainwater. The solid sewage was mostly removed from the flow in collectors, and the greater part of the sludge and water was discharged into the river. While much of the water from rainfall was diverted into large house drains, human and household wastes were not discharged into the sewers but into cesspools. The cesspools were not a satisfactory long-term solution to the sewerage problem, and a debate ensued over whether dry carriage or water carriage of human and household wastes was preferable. In the dry carriage system, wastes are collected in dry containers, which are removed and exchanged at regular intervals. In the water carriage system, wastes are flushed into the sewers, and this became standard practice in the United States. In 1880, the Paris sewers began to be connected with sewage drains from houses.

In 1842 a conflagration destroyed the older part of the city of Hamburg, and it was decided to rebuild it with, among other features, a new sewerage system. W. Lindley, a leading English engineer, designed the system, considered the first truly modern system for removal of rainwater and household wastes. The sewers of Hamburg remained among the most advanced in the world for a generation. However, the building of the sewers of Hamburg was an exceptional situation in which it was possible to plan streets and sewers together to best answer the needs of the community and local topographical conditions. More typical of the mid-nineteenth century experience in Europe was London, England, whose sewerage history was also studied closely by American engineers. Until 1815, human wastes could not be disposed of directly into London sewers. By the 1840s, London population numbered over two million, living in several hundred thousand households. Awareness of the need for sewerage reform and development led to the first comprehensive study of the metropolis for the purpose of planning sewerage improvements. In 1847, the first official engineer's report on sewerage and drainage in London contained the following description, which could have been said about almost any large city in Europe or America.

2.2.2 Definition of Drainage

The function of the field drainage system is to control the water table, whereas the function of the main drainage system is to collect, transport, and dispose of the water through an outfall or outlet. In some instances one makes an additional distinction between collector and main drainage system. Field drainage systems are differentiated in Surface and subsurface field drainage system Sometimes (e.g. in irrigated, submerged rice fields), a form of temporary drainage is required whereby the drainage system is allowed to function on certain occasions only (e.g. during the harvest period). If allowed to function continuously, excessive quantities of water would be lost. Such a system is therefore called a checked, or controlled, drainage system. More usually, however, the drainage system is meant to function as regularly as possible to prevent undue water logging at any time and one employs a regular drainage system. In literature, this is sometimes also called a "relief drainage system".

The regular surface drainage systems, which start functioning as soon as there is an excess of rainfall or irrigation, operate entirely by gravity. They consist of reshaped or reformed land surfaces and can be divided into Bedded systems, used in flat lands for crops other than rice and Graded systems, used in sloping land for crops other than rice. The bedded and graded systems may have ridges and furrows. The checked surface drainage systems consist of check gates placed in the embankments surrounding flat basins, such as those used for rice fields in flat lands. These fields are usually submerged and only need to be drained on certain occasions. Checked surface drainage systems are also found in terraced lands used for rice.

2.2.3 Main drainage systems

The main drainage systems consist of deep or shallow collectors, and main drains or disposal drains. Deep collector drains are required for subsurface field drainage systems, whereas shallow collector drains are used for surface field drainage systems, but they can also be used for pumped subsurface systems. The deep collectors may consist of open ditches or buried pipe lines. The terms deep collectors and shallow collectors refer rather to the depth of the water level in the collector below the soil surface than to the depth of the bottom of the collector. The bottom depth is determined both by the depth of the water level and by the required discharge capacity. The deep collectors may either discharge their water into deep main drains (which are drains that do not receive water directly from field drains, but only from collectors), or their water may be pumped into a disposal drain. Disposal drains are main drains in which the depth of the water level below the soil surface is not bound to a minimum, and the water level may even be above the soil surface, provided that embankments are made to prevent inundation. Disposal drains can serve both subsurface and surface field drainage systems.



Figure 2.2.3: Deep collector drain (<http://www.encyclopedia.com/doc/1O999-measure.html>).