



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**ANALYSIS ON KENAF FIBER EFFECT TOWARD
COMPRESSION CHARACTERISTICS**

This report submitted in accordance with requirement of the Universiti Teknikal
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(Maintenance Technology) (Hons.)

by

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**TAJUK: ANALYSIS ON KENAF FIBER EFFECT TOWARD
COMPRESSION CHARACTERISTICS**

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Maintenance Technology) (Hons.). The member of the supervisory is as follow:

.....

(Project Supervisor)

ABSTRACT

This study focuses on projects to analyze the impact of kenaf fibers towards compression characteristics .while in the process were develop and analyze new composite polyester resin reinforced with kenaf fiber. A feature of the new composition will be tested using a universal testing machine. The potential of kenaf fibers have seen through this project .The problem faced by expert and maker is common to find a great fiber for composites in several variables, for example, mechanical properties and physical properties of the fiber. Kenaf fiber is fiber glass fiber characteristics had been produced substitutes and other items that are currently used. Provides kenaf fiber (focus on 3mm) and polyester resin in quantities in percentage by mass for test compression using fabrication and mold to produce a composite. A test will be conducted using Universal Testing Machine (UTM) ranging 50KN maksimum. The design process involved a compression molding process to produce a composite. Analyzing the effect on kenaf fiber direction compression. The characteristics that need to be taken will be the composition of kenaf fiber and polyester resin composition with the proportion by mass percentage. After each of these materials has been set up, the creation of a reference to kenaf fiber and polyester resin made. Proposed new composite test has been taken. An analysis of the impact of kenaf fiber in the direction of compression characteristics by using Universal Testing Machine (UTM). After tests on kenaf and polyester resin in compressed results show a good mix and achieve a higher limit strength is sample D (60% kenaf and 40% polyester resin), where we know the percentage of the mixture reaches the desired objectives.

ABSTRAK

Kajian ini memberi tumpuan kepada projek untuk melakukan analisis pada kesan gentian kenaf ke arah ciri-ciri mampatan . Dalam proses ini adalah untuk menganalisis komposit baru resin poliester diperkuatkan dengan gentian kenaf. Satu ciri komposisi baru akan diuji dengan menggunakan mesin ujian universal. Potensi gentian kenaf akan melihat melalui projek ini . Masalah berhadapan dengan pakar dan pembuat adalah untuk mencari serat biasa yang hebat untuk komposit dalam beberapa pembolehubah, contohnya, sifat mekanikal dan sifat fizikal gentian. Gentian kenaf adalah serat ciri itu boleh gentian kaca mungkin pengganti dan helai dihasilkan lain yang pada masa ini digunakan. Menyediakan gentian kenaf (tumpuan kepada 3mm) dan resin poliester dalam kuantiti dalam bentuk peratusan dengan besar-besaran untuk ujian mampatan dengan menggunakan fabrikasi dan acuan untuk menghasilkan komposit. Ujian akan dijalankan dengan menggunakan (UTM) yang berkisar antara 50KN maksima . Proses reka terlibat proses pengacuan mampatan untuk menghasilkan komposit. Menganalisis kesan ke atas gentian kenaf ke arah ciri-ciri mampatan . keutamaan yang perlu diambil akan susunan gentian kenaf dan resin poliester dengan perkadaran komposisi kadar peratusan oleh berat. Selepas setiap setiap bahan-bahan ini telah diatur, penciptaan acuan untuk gentian kenaf dan bahan resin poliester dibuat. Ujian komposit baru dihasilkan akan mengambil selepas. Analisis ke atas kesan serat kenaf ke arah ciri-ciri mampatan dengan menggunakan Universal Testing Machine .selepas ujian keatas kenaf dan campuran polyester resin di mampatkan keputusan yang menunjukkan campuran yang baik dan mencapai had kekuata yang tinggi ialah sampel D (60% kenaf dan 40 % polyester resin) ,dimana kita ketahui peratusan campuran ini dapat mencapai objektif yang dikehendaki.

DEDICATIONS

The hardship in implement this project is dedicated to my lovely parents , wife and family,.

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First of all thanks to Allah S.W.T that give me the thinking to do the this project within blessing,then thanks to my family which the most important to my life ,they always give me spirit to proceed my project,After that to my supervisor ,Mr Mohd Afdhal bin Shamsudin , and best friends for the support and give the opportunity to indulgence of easing until at end of completion of my project . They always give the idea on how to work out with this project to be done and give guide to finish this PSM 1 and PSM 2 .

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LIST OF ABBREVIATION , SYMBOLS AND NOMENCLATURE

BC	-Centuries
UTM	-Universal Testing Machine
QC	-Quality Control
R & D	-Research and Development
ASTM	-American Standard of Testing Method
μ	-Micro
\pm	-Plus minus
CS	-Compression Strength
W	-Mass of example
V	-Volume of example
In	-Inch
mm	-Millimeter

CHAPTER 1

INTRODUCTION

1.1 Kenaf Plant

Towards green technology, composite fatigue life and kenaf fiber-reinforced is one way investigated. The point of this study is to dissect the fiber modification effect through mechanical characteristics of kenaf fiber strengthened polyester resin composites. Primary materials utilized as a part of this undertaking is a polyester resin and saturated kenaf fibers. Kenaf is a material that performs high load pressure for the compression test.

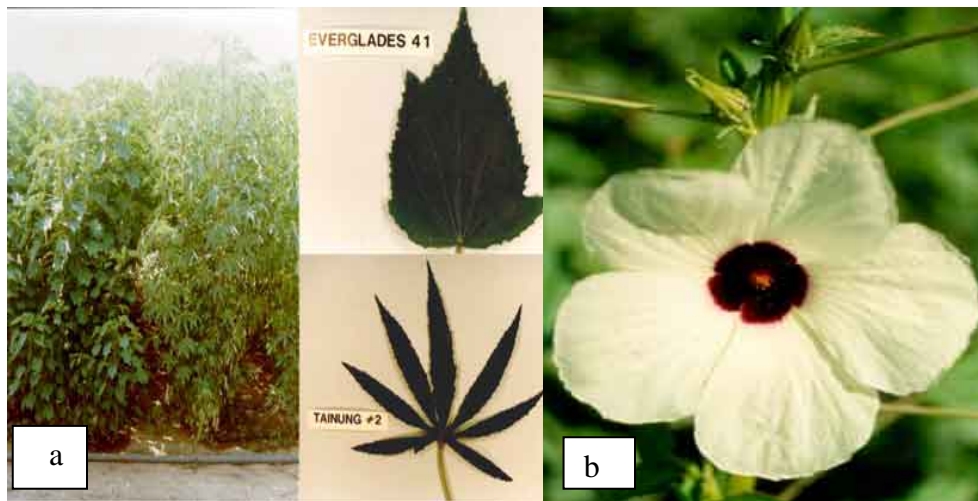


Figure 1.1 : (a) Kenaf plant leave and (b) flower
(lembaga kenaf malaysia ,2015)

1.2 Natural fibers as Major type of Fibers.

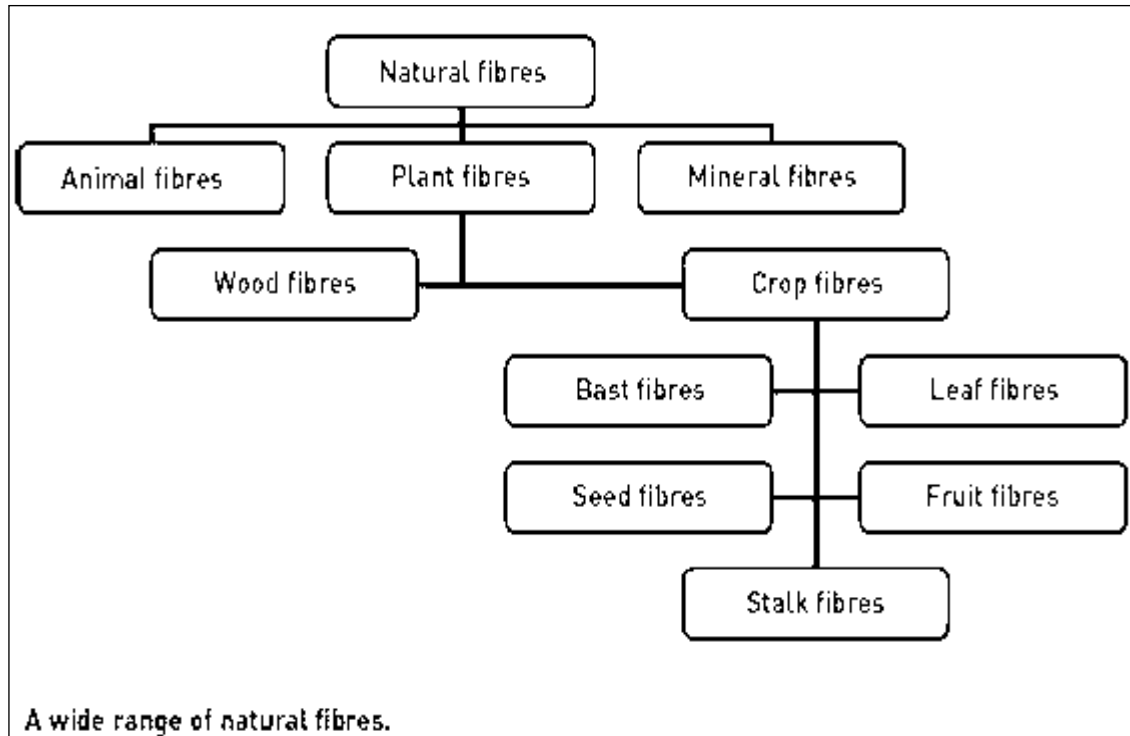


Figure 1.2 : Classification of fibers.

(Textile Learner , 2014)

Natural fibers are extraordinarily extended substances created by plants and creatures that can be spun into fibers, string or rope. Woven, weaved, tangled or reinforced, they frame fabrics that are vital to society.

Like farming, materials have been a major piece of human life since the beginning of civilization. Pieces of cotton articles dated from 5000 BC have been unearthed in Mexico and Pakistan. As indicated by Chinese convention, the historical backdrop of silk starts in the 27th century BC.

The most established fleece material, found in Denmark, dates from 1500 BC, and the most seasoned fleece floor covering, from Siberia, from 500 BC. Filaments, for example, jute and coir have been developed since relic.

While the techniques used to make fabrics have changed significantly from that point forward, their capacities have changed almost no: today, most common filaments are still used to make dress and holders and to protect, mollify and adorn our living spaces. Progressively, notwithstanding, customary materials are being utilized for modern purposes and additionally in segments of composite materials, in medicinal inserts, and geo- and agro-materials.

They go from cotton, which overwhelms world fiber creation, to other, forte filaments, for example, cashmere which, however created in far littler amounts, have specific properties that place them in the extravagance materials market.

1.3 Problem Statement

Currently this time , fiber are widely utilized as a part of the composite innovations as the substitution of traditional fiber that can lessen the creation expense of the composite item. Worldwide natural issues have prompted a replenished enthusiasm for bio-based materials, with the attention on renewable crude materials can be biodegradable or recyclable at sensible expense (C.K. Hong et, al. 2007).

The problem confronted by the specialists and makers is to locate the great normal fiber for composite in the few variables, for example, mechanical properties and physical properties of the fiber. Kenaf fiber is a characteristic fiber hence can possibly substitute fiberglass and other manufactured strands that are as of now utilized.

The great properties of kenaf fiber incorporate great particular qualities and modulus, sparing suitability, low thickness and low weight . However, there are relatively few exploration done to the size and measurement of the fiber utilized as a part of the natural fiber reinforced polyester resin based on the effect . In this venture, the impact of the fiber estimate on mechanical properties can influence the properties of the composite created.

1.4 Objective of Research

- To analyze kenaf effect of fiber towards compression characteristics.
- To find effect of kenaf fiber strength by using universal test machine
- To compared the best composition of kenaf with polyester resin sample .

1.5 Scope of Research

- i. Preparing of kenaf fibers (focus on 3mm)and polyester resin in quantities in the form of percentages with mass .
- ii. A testing will be conducted by using the Universal Testing Machine (UTM) that range is 50KN maximum.
- iii. Analyzing the effect on the kenaf fibers toward the compression characteristics .

CHAPTER 2

LITERITURE REVIEW

2.1 Kenaf

Kenaf principal scientific name *Hibiscus L. cannabinus* is a plant that originated in Africa. This plant has already been identified almost 4000 years ago. The results of scientific research, Kenaf is a plant that is classified in the group of the families Malvacea Hibiscus.

Reaching a height of 3.7-4.3 meters in just 4 weeks. This plant is only capable of flowering day. The kenaf plant stalk consists of two types of fibers that are useful in the outside of the fibers and the fibers within.

Fiber external skin or known as fiber containing 40% by weight of the dry stalk weight and size of the fiber length is regularly 2.6mm when prepared. The fiber is suitable for use as a raw material in the manufacture of paper . Capable of producing fibers which are 6mm .

2.2 Natural Fibers

Natural fiber braced composites polymer are going upper mind blowing diversions of all substances specialists and researcher of late in light of the necessity for building up an earth all around arranged material, and not entirely substituting starting now used glass for composite stronghold [Li Y, Mai Y W 2006].

Also, a characteristic rule and defenselessness resources of timber and petroleum were actuated more eagerness for making material composite of normal strands [Ahmad M H M 2008].

2.2.1 Bast Fibers

Bast fiber (additionally called phloem fiber or skin fiber) is plant fiber gathered from the phloem (the "inward bark", once in a while called "skin") or bast encompassing the stem of certain dicotyledonous plants. They bolster the conductive cells of the phloem and give quality to the stem.

A large portion of the financially critical bast strands are gotten from herbs developed in agribusiness, concerning case flax, hemp, or ramie, additionally bast filaments from wild plants, as stinging bother, and trees, for example, lime or linden, wisteria, and mulberry have been utilized as a part of the past[Mary Dusenbury (1992)] Bast filaments are delegated delicate filaments, and are flexible.[Esau, K. (1977)] Strands from monocotyledonous plants, called "leaf fiber", are named hard strands and are stiff.[Esau, K. (1977)]

Since the important filaments are situated in the phloem, they should frequently be isolated from the xylem material ("woody center"), and now and then likewise from epidermis. The procedure for this is called retting, and can be performed by smaller scale creatures either ashore (these days the most critical) or in water, or by chemicals (for occasion high pH and chelating specialists) or by pectinolytic proteins. In the phloem, bast strands happen in packages that are stuck together by pectin and calcium particles.

More exceptional setting isolates the fiber packs into rudimentary filaments, that can be a few centimeters in length. Frequently bast strands have higher elasticity than different sorts, and are utilized as a part of amazing materials (once in a while in mixes with cotton or manufactured filaments), ropes, yarn, paper, composite materials and burlap. A critical property of bast strands is that they contain a unique structure, the fiber hub, that speaks to a powerless point, and gives adaptability. Seed hairs, for example, cotton, don't have hubs.

2.3 Composite

Composite (material structure, likewise called or abbreviated to composite) is material made of two or more constituent materials with qualities altogether diverse physical or compound, which when joined, produce a substance that has distinctive attributes than the individual parts , Individual segments stay separate and unmistakable in structure prepared. New material is favored for some reasons: regular cases incorporate materials that are more grounded, lighter or less expensive when contrasted and conventional materials.

2.3.1 Commonplace building composite materials including:

1. Composite building materials, for example, bond, concrete
2. Fortified plastics, for example, fiber strengthened polymer Metal Composites
3. Earthenware composite (fired and metal lattice composites)

Composite materials are commonly utilized for structures, extensions and structures, for example, pontoon bodies, board pools, race auto body, slow down shower, shower, stockpiling tanks, impersonation rock and refined marble sinks and ledges. Illustrations of the most developed space apparatus to do routine and flight in requesting situations.

2.4 Polyester Resin

Polyester resin is a sap framework that is most broadly utilized, especially in the marine business. So far the dominant part of dinghies, yachts and timber boats manufactured in the composite occupation utilizing this pitch framework.

There are two regulation sorts of Polyester resin used as overlaying systems standard as a piece of the composites business. Orthophthalic Polyester resinthe standard monetary pitch used by various people. Isophthalic Polyester pitch is at present transforming into the material of choice in business ventures, for instance, sea where pervasive water resistance is alluring.

The figure2.4below demonstrates the substance structure perfect for polyester type.

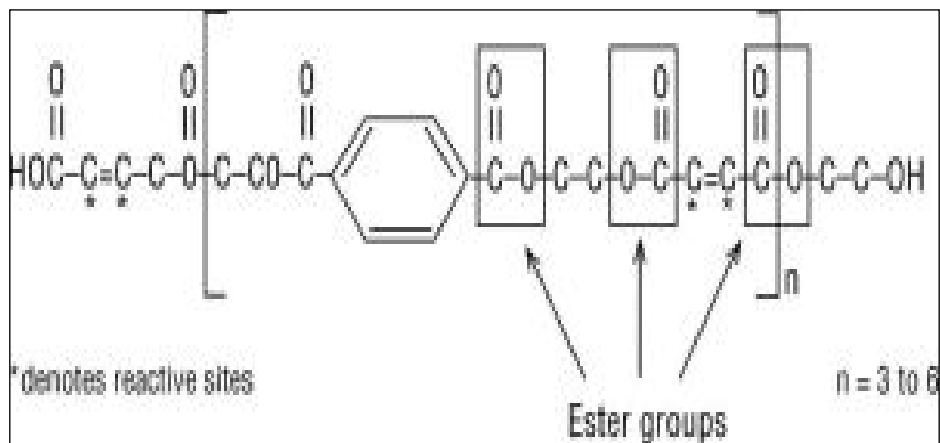


Figure 2.4 Polyester Structure

(Net-composites 2015)

2.4.1 Resin

Resin, is mean for uncommon wording, is numerous plants of a hydrocarbon , and it is a coniferous tree. It vary to another fluid found by plants, for example, elastic, or bodily fluid.

A wide and "resin" are also used for dense liquids, other than it is a basic synthetic polymer (synthetic resin), which is used in normal circumstances, be hard on a solid transparent or non-transparent.

Natural plant resins evaluated for chemical properties and the right things, for example the production of adhesives, varnishes .

2.4.2 Polyester

Polyester is regularly characterized as long-chain polymer science involving 85% by weight of in any event dihydric alcohols and esters and Terephthalic corrosive" .also, it likewise means to unite a percentage of the ester in the fiber. This is the family's most widely used and economical resin. It is widely used in reinforced plastics.

2.4.2.1 Polyester Characteristics

1. Strands and fabrics are extremely solid.
2. It is effortlessly washed and dried.
3. Hydrophobic in nature and snappy drying. It can be utilized for protection by making empty strands.

4. Keep up its shape and subsequently it respects make outerwear for the cruel atmosphere.
5. Extremely tough impervious to most chemicals, extend and therapist, wrinkle-safe, mold and scraped spot safe.

2.5 Fabrication

Molded products are regularly alluded to as a board. For specific geometries and material blends, it can be alluded to as an electrical switch.

In the mold, support and framework materials are consolidated, compacted, and cured (handled) to experience combination occasions. After the show of solidarity, frame the base set, despite the fact that it can twist under certain procedure conditions. For thermoset polymer grid material, the curing response blend is started utilizing extra warmth or synthetic re activity, for example, a natural peroxide. thermoplastic polymer grid material, the solidarity of this nation is the hardening of fluid. metal grid materials, for example, titanium thwart, the solidarity is to consolidate at high weights and temperatures close to the softening point.

Reference strategies, it is anything but difficult to allude to the one-piece form as the mold "low" and another reference as "upper" mold. Lower and upper alludes to the characteristics of the board is shaped, there is a reference arrangement in space. For this situation, there is dependably a lower mold, and now and then shape on. Part development starts by applying materials to the lower mold. A lower mold and the mold is more regular depiction of the terms of the more broad and particular, for example, the male, the female side, b-side, the media, dish, cap, mandrel, and so on. Consistent assembling utilizing an alternate terminology.