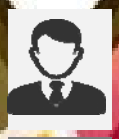
DEVELOPMENT OF KENAF GRINDED CORE AS A LIGHTWEIGHT MATERIAL TO REPLACE EXPANDED POLYSTYRENE (EPS) GEOFORM IN GEOTECHNICAL APPLICATION



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ABSTRACT

Construction of road embankment over soft ground had been practiced using lightweight materials which is expanded polystyrene (EPS) geoform. However the application of EPS in Malaysia is still low due to its various limitations when apply in different situations of engineering construction. This research aims to produce a bi-product from kenaf grinded core fibre to replace expanded polystyrene geoform in line with the national aspiration of using green materials. Kenaf plant has been identified as a potential biomaterial to replace EPS lightweight materials due to its lightweight property. This replacement material should have the same functions as lightweight replacement materials and also able to overcome the disadvantages in EPS such as susceptible to hydrocarbon erosion, lack in fire resistance, low in ultra violet resistance and susceptible to floatation.

RESEARCH TEAM

Pengarah
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(Research Advisor)

UiTM	JKR	Kefi (M) Sdn. Bhd.
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METHODOLOGY

Phase 1:

- Literature Review and Problem Analysis;
- New formula of kenaf hybrid composite suitable for strength performance of geotechnical;
- Fabrication of tensile specimen;
- Tensile, Compression Testing and Fracture Analysis.

Phase 2:

- Simulation of the construction of kenaf grinded core lightweight materials in construction of road embankment over soft ground using Plaxis 3D;
- Construction of trial embankment with kenaf lightweight materials;
- Monitor the in-situ performance of kenaf lightweight materials in terms of settlement and stability.

PROBLEM STATEMENT

- Construction of embankment over soft or loose soils will have to deal with settlement problem and stability problem of the loose soil sue to the incapable of supporting the increased loads.
- Must identify innovative materials and construction techniques by reducing vertical stress on the underlying soil so to reduce settlement problem, stability problem and accelerate the project construction.
- One of the option is to replace the earth fill with light weight material which is expanded polystyrene (EPS) geofoam.
- However this material has its limitations such as Susceptible to hydrocarbon erosion; Lack in fire resistance; Low in ultra violet resistance and Susceptible to floatation.
- Therefore there is a need to develop material which is able to overcome the above shortcoming for Geotechnical engineering application.

OBJECTIVE

1. To produce lightweight composite material derived from kenaf and other polymer as an engineered material for road embankment material.
2. To formulate novel composite material that mimics commercial synthetic material and reproduce similar mechanical functionality.
3. To explore the diversification on the usage of kenaf and polymer in composite material
4. To determine the physical, chemical and engineering properties of kenaf lightweight materials;
5. To investigate the stress development and deformation of kenaf lightweight materials under constant load;
6. To evaluate the in-situ performance of kenaf lightweight materials in Geotechnical engineering application particularly in construction of road embankment over soft ground.

OUTPUT

A lightweight product from kenaf core fiber to replace EPS for geotechnical application

IMPACT

- To replace the current material for road embankment with eco-friendly kenaf composite
- Serve as a stimulus to consolidate a new kenaf composite derived from local agricultural industry, in line with the NKEAs. This research proposal is also aiming at business service by raising the productivity and enhancing the competitiveness of the entire economy, leading to a multiplier effect on its wider economy.

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