

**THE USE OF FIBER FROM OIL PALM TRUNK
(OPTF) AS A CONCRETE FIBROUS
REINFORCEMENT**



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ABSTRACT

Concrete has high compressive strength, stiffness, low thermal, low electrical conductivity and low toxic. However, concrete is brittle and weak in tension. When subjected to tensile stress, unreinforced concrete will crack and fail. Reinforcement with randomly distributed short fibers presents an effective approach to curb the crack propagation and improving the ductility and tensile strength of concrete.

Malaysia is the largest palm oil producer and contributes about 57.6% of the total supply of palm oil in the world. Intensive plantation was started in the 1960's. Since the average economic life of the oil palm is estimated at around 25 years, a large amount of the trunk is available during replanting by 1985. As the housing development increase, a lot more of oil palm estate have been cleared. The felled off oil palm trunks creates environmental pollution as it encourage fungal and infestation to the young trees. The utilisation of oil palm trunk fiber will be advantages into two folds. First, saving the cost as alternative fiber to replace synthetic fiber for used in concrete as reinforcement. Second, the economic way of disposal of oil palm by-product and create healthy environment.

In this studies, four different concrete mixes with different fiber content namely 0%, 1%, 2%, 3% and 4% were cast. The parameters to be tested are flexural strength, compressive, and tensile strength (by splitting), modulus of elasticity, PUNDIT, durability and post deflection crack behaviour. The durability test was tested by

immersion test and ability to resist water and chemical attack in terms of weight gain or loss. The parameters obtained were compared to that of plain concrete (without fiber) and to that of concrete using other types of fiber. The effect of using different length of fiber were also examined. The effect of fiber content to the workability was also investigated. Grade 30 concrete with constant w/c, cement : aggregate ratio was employed. Morphology using Scanning Electron Microscope (SEM) was also examined. The results was also analysed statistically.

The results shows that 1% fiber content give the best performance in terms of flexural strength, compressive, and tensile strength. Increase the fiber content more than 1% cause drop in slump and strength of concrete. Increase of fiber content reduce workability. However, adding up to 0.5% (by cement weight) superplasticiser can maintain workability as that of plain concrete The durability shows that concrete with OPTF can resist water and NaCl as good as plain concrete. However, its performance in NaOH and HCl is still doubted as the SEM photograph shows indication of degradation but yet to be confirmed. However, in terms of weight change the fiber concrete show weight loss as much as plain concrete.

Keywords : Fiber Reinforced Concrete, Oil Palm Trunk Fiber, Strength, Durability, Modulus of Elasticity, Scanning Electron Microscope.