THE BENDING STRENGTH OF REACTIVE POWDER CONCRETE (RPC) RECTANGULAR BEAM WITH OIL PALM TRUNK FIBRE REINFORCEMENT

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LAPORAN AKHIR PENYELIDIKAN "THE BENDING STRENGTH OF REACTIVE POWDER CONCRETE (RPC) RECTANGULAR BEAM WITH OIL PALM TRUNK FIBRE REINFORCEMENT"

Merujuk kepada perkara diatas, bersama-sama ini disertakan tiga (3) naskah Laporan Akhir Penyelidikan bertajuk "The Bending Strength of Reactive Powder Concrete (RPC) Rectangular Beam With Oil Palm Trunk Fibre Reinforcement" oleh kumpulan Penyelidik berkenaan dari Fakulti Kejuruteraan Awam (FKA), Universiti Teknologi MARA(UiTM), Shah Alam, untuk makluman pihak Y.Bhg. Prof.

Sekian terima kasih.

Yang benar,

DR. HAMIDAH BT. MOHD. SAMAN
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ABSTRACT

In the present investigation, the possibility of using Oil Palm Trunk Fibre Reinforced Plastic (OPTFRP) as a reinforcement to replace steel in concrete was studied. OPTFRP was produced by using PVC pipes of appropriate diameters filled with fibre bundles of oil palm trunks of arbitrary lengths, and then pressure-injected with polyester resin. The prepared FRP bars were then left to cure partially at room temperature prior to demoulding, after which further curing commenced indefinitely. Expecting that the OPTFRP is low in tensile strength compared to that of steel, the possibility of using Reactive Powder Concrete (RPC), a very high strength concrete, to compensate the lack of that tensile strength was explored. RPC is invented with its superior toughness where it is reported that the use of supplementary shear and other auxiliary reinforcing steels can be eliminated. Four (4) series of concrete beams consisted of two identical of RPC specimens and two identical specimens of Grade 30 concrete designated RPC(A)-Steel, RPC(B)-Steel, RPC(A)-OPTFRP, RPC(B)-OPTFRP, Grade 30(A)-Steel, Grade 30(A)-OPTFRP were prepared. The results showed that the capacity of moment resistance of RPC rectangular beam reinforced with steel is more than twice of those made of Grade 30 concrete. However, RPC reinforced with OPTFRP did not show any improvement in capacity to resist moment. The use of even RPC failed to enhance the capability of beam reinforced with OPTFRP to resist moment.

CHAPTER ONE
INTRODUCTION

1.1 General Introduction

At present, concrete (or, strictly speaking, reinforced concrete) has been extensively used for structures and foundations in almost every branch of civil engineering and architecture. Its high compressive strength, its fire systems via continuous and/or distributed reinforcements have led to its emergence as the dominant construction material. However, conventional concrete or even conventional high performance or high strength concrete lacks both the direct and shear strengths resulting in stocky structural members and excessive shear reinforcement. The latter prevents the brittle nature of diagonal tension failures by compensating for the reduced shear strength of the concrete.

Moving towards becoming a highly industrialised country and knowledge-based nation, Malaysia has to embark on concerted efforts in the establishment of research and development agenda on advanced construction materials through the exploitation of local resources that are available in abundance. The output of this research will shed a light on the future of