

**EFFECTS OF DIFFERENT RESIN CONTENT AND PARTICLE SIZES ON  
PROPERTIES OF THREE LAYERED PARTICLEBOARD USING OIL PALM  
FROND**



**RESEARCH MANAGEMENT INSTITUTE (RMI)  
UNIVERSITI TEKNOLOGI MARA  
40450 SHAH ALAM, SELANGOR  
MALAYSIA**

**BY**

**SITI NOORBAINI SARMIN  
PROF. DR. JAMALUDIN KASIM**

**NOVEMBER 2012**

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## LETTER OF OFFER (RESEARCH GRANT)

Surat Kami : 600-RMI/ST/DANA 5/3/Dst (280/2011)  
Tarikh : 6 Jun 2011



**Pn Siti Noorbaini Sarmin**  
Fakulti Sains Gunaan  
Universiti Teknologi MARA Cawangan Pahang  
26400 Bandar Pusat Jengka  
Pahang

Y Brs. Profesor/Tuan/Puan

### KELULUSAN PERMOHONAN DANA KECEMERLANGAN 06/2011

Tajuk Projek Effect Of Different Resin Content And particle Sizes On Properties Of Three Layered Particleboard Using Oil Palm Frond  
Kod Projek 600-RMI/ST/DANA 5/3/Dst (280/2011)  
Kategori Projek KategoriF(2011)  
Tempch 15 Jun 2011 - 14 Jun 2012 (12 bulan)  
Jumlah Peruntukan RM 6.0C0.00  
Ketua Projek Pn Siti Noorbaini Sarmin

Dengan hormatnya perkara di atas adalah dirujuk.

2. Sukacita dimaklumkan pihak Universiti telah meluluskan cadangan penyelidikan Y. Brs Profesor/tuan/puan untuk membiayai projek penyelidikan di bawah Dana Kecemerlangan UiTM.

3. Bagi pihak Universiti kami mengucapkan tahniah kepada Y. Brs. Profesor/tuan/puan kerana kejayaan ini dan seterusnya **diharapkan** berjaya menyiapkan projek ini dengan cemerlang.

4. Peruntukan kewangan akan disalurkan melalui tiga (3) peringkat berdasarkan kepada laporan kemajuan serta kewangan yang mencapai perbelanjaan lebih kurang 50% dari peruntukan yang diterima.

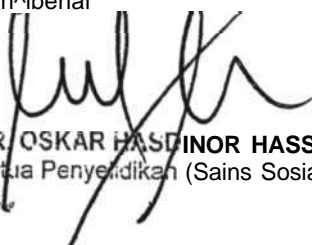
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5. Untuk tujuan mengemaskini, pihak Y. Brs. Profesor/tuan/puan adalah diminta untuk mengemaskini semula kertas cadangan penyelidikan sekiranya perlu, mengisi borang setuju terima projek penyelidikan dan menyusun perancangan semula bajet yang baru seperti yang diluluskan. Sila lihat lampiran bagi tatacaja tambahan untuk pengurusan projek.

Sekian, harap maklum.

**"SELAMAT MENJALANKAN PENYELIDIKAN DENGAN JAYANYA"**

Yan^lbenar

  
**DR. OSKAR HASDINOR HASSAN**  
Ketua Penyelidikan (Sains Sosial dan Pengurusan)

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## 5.2 Enhanced Executive Summary

The objective of this study was to examine the properties of three layered particleboard from oil palm frond (OPF) with different ratio resin contain and particle sizes within face/back and core. Four different ratio of resin contain; 12:10:12, 12:8:12, 10:10:10 and 10:8:10 were used with particle size for core; 2mm and face/back; 1mm. Urea Formaldehyde (UF) was used as a binder with addition of wax and without wax. The target density was 500kg/m<sup>3</sup>. The properties of bending strength, internal bonding (IB), thickness swelling (TS) and water absorption (WA) were evaluated base on JIS A-5908 standard. From the result, it shown that modulus of rupture and modulus of elasticity were perform better with particleboard using ratio 12:8:12 bonded with UF without wax and meet the standard. The internal bond strength was parallel with bending strength except for board using 12:10:12 ratio bonded using UF with addition of wax. Samples using resin contain with ratio 12:8:12 had the lowest thickness swell and water absorption but did not meet the above standard. The thickness swelling and water absorption rate were reduced in samples prepared with addition of wax. The ratio of resin contain within the layered affected the properties of particleboard manufactured from oil palm frond. Based on the findings of this study, oil palm frond has the potential to be used to manufacture particleboard, and further study is required to improve its dimensional stability.

### 5.3 Introduction

Composites defined as materials that have the commonality of being glued or bonded together. Indirectly, resin, glue or another binder play an important role in producing a quality composites. In other word "composite" means "consisting of two or more distinct part" (Bhagwan and Lawrence, 1980). Thus, a material having two or more distinct constituent materials or phases may be considered a composite material. Researchers all over the world are currently studying the formation of new types of composites that combine lignocelluloses with glass and plastics or synthetic fibres (Jamaludin, 1999).

Most composite material developed so far has been fabricated in order to improve its mechanical properties such as strength, stiffness, toughness and high temperature performance. They are currently being used in building material such as doors, windows, walls and floorings, reusable packaging and other products. Composite material can be classified based on the geometry of the material reinforcement. In the wood industry a composite is defined as a reconstituted product (Bhagwan and Lawrence, 1989).

Composite material can be classified based on the geometry of the material reinforcement. In the wood industry a composite is defined as a reconstituted product made from a combination of one or more substances using some kind of mastic to hold the components together. The best known wood composites are particleboard and fibreboard (John, 1982).

In Malaysian, wood-based industry in Malaysian comprises of sawn timber veneer and panel products which include plywood and other reconstituted panel product such as OSB, particleboard, chipboard, fibreboard, mouldings and builders joinery and carpentry (BJC). The industry is predominantly owned by Malaysian and it is estimated that 80% of timber-based companies are small and medium-size companies. In view of the need to maximize the utilization of wood resources, the industry has diversified into the production of high value-added reconstituted panel products such as OSB and particleboard. The