THE EFFECT OF DIFFERENT DENSITY ON THE MECHANICAL AND THERMAL PROPERTIES OF MIXED-HARDWOOD PARTICLE BOARD

MIA SYAZWINA BINTI MAHFUZ

Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Physics
in the Faculty of Applied Sciences
Universiti Teknologi Mara

JULY 2017

ABSTRACT

In this study, the effect of density on thermal and mechanical properties of mixed hardwood particleboard was investigated. The preparation of mixed hardwood particleboard was produced using hardwood particles. The resin or adhesive used to bind the particles together was urea formaldehyde (UF). Under the same production conditions, only the densities were varied. The particleboard were produced as 400 kg/m^3, 500 kg/m^3, and 600 kg/m^3. The boards were then went through a series of mechanical and thermal tests. Mechanical properties of the particleboard were characterized by tensile (Modulus of Rupture, MOR), water absorption, and thickness swelling while the thermal properties were characterized by thermal conductivity, thermal diffusivity, and specific heat capacity. It was found that the MOR and thermal conductivity increased linearly while thermal diffusivity, heat capacity, water absorption, and thickness swelling decreases linearly with the increase in particleboard density. The 400 kg/m^3 has the highest specific heat capacity which is 1.49 J/kg.K and lowest MOR, thermal conductivity, and thickness swelling which are 2.73 MPa, 0.1427 W/m.K, and 28.84% respectively. The 500 kg/m^3 has the highest thermal diffusivity which is 0.2553 mm^2/s and thickness swelling which is 40.90%, while it has the lowest specific heat capacity which is 1.17 J/kg.K. The 600 kg/m^3 leads in the MOR and thermal conductivity by having a value of 11.83 MPa and 0.1696 W/m.K respectively. However, it has the lowest value of thermal diffusivity and water absorption which are 0.2249 mm^2/s and 115.97% respectively.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES