

**UNIVERSITI TEKNOLOGI MARA**

**MECHANICAL AND THERMAL PROPERTIES OF  
COMPOSITE BOARD PREPARED BY USING HIGH DENSITY  
POLYETHYLENE (HDPE) AND SAW DUST WITH ADDITION  
OF MALEIC ANHYDRIDE (MA) AS COUPLING AGENT**

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## **ABSTRACT**

Increasing amount of agriculture waste in Malaysia recent years has brought many environmental issues and economic concerns in the country. This study presents the excessive wood sawdust was recycled and used as organic filler and high density polyethylene (HDPE) as polymer matrix in produces the sample of composite board with the addition of maleic anyhride (MA) as coupling agent. Fillers and matrix were weight according to the percent formulation of 20:70, 30:60, 40:50 and 50:40 respectively. Though, the amount of coupling agent added was fixed to 10% of total weight of every sample. The composites were prepared by using hot press which needs to produce different molding for every mechanical properties and small amount of each sample were taken and their mechanical properties for flexural and tensile strength were studied. In conclusion, both flexural strength and tensile strength were found to improve with addition of coupling agent in composites which was related to improved interfacial bonding between the natural fibers as filler and the HDPE as a polymer matrix.

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# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION

A combination between polymer and wood is an innovation that has been designed diligently during 1970's. As the result of combination from those two components, it has produces a material with intrinsic properties of innovated wood with having many advantages. Since then, the revolution of wood plastic composite (WPC) has been introduced to the industry. Nowadays, the idea of wood plastic composite getting broader as all kind of composites with the presence of natural fibres together with polymer is refer as wood plastic composites (WPC) [1]. As the primary elements are very contrast in chemical and physical properties, this kind of composite typically contains other enhancer to increase the harmony which might be bonding across the reaction of the polymer and natural fibres. Regarding the preferences necessity of what kind of polymer compatible with the composites which typically shown that thermoplastics are favoured compared to others because they provide the benefit of the possibility in repeated melting processes, contrast with thermosetting polymers that most likely become stagnant in solid state after an initial increased temperature of one processing cycle which will cause the polymerization. As the natural fibres and polymer is using twin screw extruder for mixing and obtaining the mixed composites, thermoplastics are the most suitable choice as it convenience to be used. Therefore, after the composites acquired, the procedure proceed with pressing the composites under certain temperature to accomplish the desired outputs. The massive development of the innovation between natural fibres and polymer has come out with WPC which consequences parallel with progression in both approach and technologies, as the synchronization of the development for conventional products as it new designs.

Though, mechanical properties of polymer matrix and natural fibres fillers where high density polyethylene and sawdust composites such as bending strength shows an anticipating improvement with the higher percent of high density polyethylene as polymer matrix. Regardless the effect of the coupling agent presence, with the higher percent of high density polyethylene in the composite board as a polymer matrix, the bending strength properties should become better. This is due to the high density polyethylene characteristics which is more flexible and possess high melting point. However, to improve the composites board