

## ANALYSIS OF POLYPROPYLENE ACACIA FIBERS

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### ABSTRACT

*In this polypropylene acacia composites were developed and studied for wear behavior at different applied loads and acacia concentrations. Wear tests were conducted using taber abraser or taber abrader apparatus. The composite discs were tested against E100-125 steel disc. The specific wear rate of polypropylene reduced on addition of acacia powder. The coefficient of friction of polyester resin increased on cotton reinforcement and reduced significantly on addition of graphite in cotton-polyester composite. The temperature of contact surface reduced on addition of acacia in polypropylene composite.*

### 1. INTRODUCTION

The kinds of composite material used in production technology and their use areas are continually increasing. On account of their good combinations of properties, fiber-reinforced-polymer composites are used particularly in the automotive and aircraft industries and the manufacture of spaceships and sea vehicles [1–3]. There are the two main characteristics which make these materials attractive compared to conventional metallic designs. They are of relatively low density and they can be tailored to have stacking sequences to provide high strength and stiffness in directions of high loading [4]. The environment friendly, natural-fibre reinforced polymer composites are being preferred over the synthetic fibre reinforced composites due to their inherent bio-degradability, low density, a range of mechanical properties, less abrasiveness, etc.[2–8]. The application of nanoparticles with polymers for novel composites is a rapidly developing field of study and has become one of the most promising means of dramatically enhancing the physical properties of plastics[9].

Amongst the natural fibres, acacia is one of the most popular fibre used in several applications those varying from common fabrics to composites.

Polypropylene (PP) was the thermoplastic used in this work, being a semi-crystalline polymer with various industrial applications [10], but it is also a commodity polymer by the low cost, low level of mechanical resistance, processing facility and larger production [11]. This polymer remains unaffected when it comes in contact with chemicals such as alkaline substances, acids, de-greasing agents, electrolytic attacks, etc. However, its resistance towards aromatic or aliphatic hydrocarbons, chlorinated solvents and ultraviolet radiation is not very strong. Its tensile strength is quite high. It shows strong resistance towards stress and cracking. Polypropylene is crystalline in nature and possesses a regular geometrical shape. Polypropylene does not get damaged by water exposure because its moisture absorption is very low.

Many studies of the wear mechanism of acacia-polypropylene composites have been carried out [3, 11–14]. In the past, this material was used for the manufacture of statically loaded parts but nowadays, after some improvement on material, it is used for the manufacturing of components that sustain dynamic effects [2]. In the production industry, non-metal composite materials have begun to be used instead of steel and other metals. For this reason, the wear resistance of this material according to mechanical effects must be known [3]. In industry, particularly materials working in places under wear effects, are desired to resist wear. The wear resistance of materials was determined by the result of laboratory experiments. In this study, the wear behaviours of a acacia polypropylene composite and plain polypropylene were experimentally investigated under various loads and speeds.

### 2. EXPERIMENTAL:

#### 2.1. Materials and specimens:

In this study, a acacia powder and polypropylene (MAPP110) were chosen as test

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