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DESIGN ANALYSIS OF A PLASTIC SHREDDING MACHINE

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ABSTRACT

Waste is naturally produced by all humans and poses grave health and environmental risks. The lack of proper waste disposal in developing communities leads to disease outbreaks. Most of the wastes available are made up of plastic materials. Shredding of plastic is a crucial step in the recycling process of plastic materials and the machines available for its execution are bulky, scarce and generally unavailable. This paper aims at the design analysis of a shredding machine for processing plastic wastes, focussing on crushing of waste high density polyethylene (HDPE). From the analyses, the minimum required power to shred HDPE was obtained as 721 N and the electric motor to drive the system was determined to be 5 hp. The bending and twisting moments acting on the shaft were determined to be 16 Nm and 15.3 Nm respectively which led to the selection of a shaft of 25 mm diameter. Further study to be conducted is applying the design result for fabrication and performance evaluation of the plastic shredding machine.

Keywords: *Crushing, Design Analysis, Waste, Plastic, Shredding Machine*

1 INTRODUCTION

Waste is naturally produced by all humans and has great health and environmental implications. Indiscriminate loitering of waste is prevalent in our streets due to high rate of production and inadequate disposal mechanisms. Studies link the lack of proper waste disposal to water contamination in developing communities and cholera outbreak in those places (Al-Gheethi *et al.*, 2018; Ike *et al.*, 2018). Aside from these serious risks of traffic congestion in developing nations, blockage of drainage systems rank high among problems caused by lack of efficient waste