

Effect Of Hammer Edge Incline And Grinder Velocity On Some Hammer Mill Performance Indicators

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Abstract The study aims to save hammer manufacturing materials and reduce energy consumption without harmfully impacting the performance of the hammer mill. It involves two factors —the slope of the hammer edge and the angular velocity and their effect on the mill capacity (MC), Modulus of fineness (FM) and specific energy consumption (Spc). A hammer mill was manufactured locally for this purpose, with an electric motor capacity of 1 hp. The hammer edge incline was done by making a deliberate cut in the edge of the hammer in an angle. Therefore, the study was carried out with four levels of incline angles—0°, 30°, 45° and 60°—with three angular speeds for the mill—1100, 1247 and 1467 r p m. The results showed that there was a significant effect of hammer edge and angular velocity in MC, FM and Spc. The 30° angle caused a decrease in mill capacity and an increase in the mill's energy consumption more than the rest of the edge angles, as it recorded a mill capacity of 16.96 kg. h⁻¹ vs. 25.12 , 21.2 and 19.46 kg.h⁻¹ for hammer 0° angle , 60° and 45°, respectively. The 60° angle showed the lowest FM for grinding. The mill capacity increases and the energy consumption decreases as the angular velocity increases.

Key words: blades, crusher , tip speed , fineness degree , hammer type , hammer style and milling efficiency.

Introduction

Mills, like the hammer mill, are used to minimize the size of raw materials granules for a variety of uses, including the production of human and animal foods and medicines. The most critical component of a grinding machine is the hammer. Many different hammer types are now available from manufacturers all over the world. Choosing hammers before starting to manufacture the mill, as well as identifying the method of operation and the wearable parts of the operation is necessary to maintain low maintenance costs from the beginning. Additionally, it is necessary to maintain the quantity and quality of the product in an acceptable condition. Hammers without processing the edges in order to strengthen them, according to what is followed by European countries. Hammers with a hardened finish are preferred by feed mills in North and South America (Mark, 2019). Every market has a hammer style that best fits their needs. Various shapes of hammers are available other than the traditional rectangular shape.

Khudher, et.al.,(2021) studied the effect of the surface area of the blade exposed to the force of collision with the corn kernels to be crushed, and they found that the blade with a letter T-shape