

Design and simulation of continuous melon fruit depodding machine

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Abstract

Melon fruits are usually depodded in Nigeria using traditional/manual method which is not only curbersome, but equally time consuming, and poor quality of finished products obtained. In other to curb these problems, a continuous melon fruit depodding machine was designed and simulated for failure. The Melon fruit depodding machine was made up of the following main units; hopper, depodding chamber, electric motor, chain, sprocket, bearings, and frame which act as supporting base. The depodding machine has a maximum capacity of 0.185m³, and this volume can take melon fruit of 28.25 kg powered by 2.5 hp, 1440 rpm electric motor. The following parameters were design for; depodding force, torque, power, shaft diameter, bearing, density, basic dynamic load on bearing, basic dynamic life of bearing, velocity ratio, etc. The results obtained from the detail design show that a depodding force of 277.13 N and torque of 27.713 Nm was required for the operation of the machine. SolidWorks CAD was used for the simulation of the machine. The Von Mises stress obtained was less than the yield stress, thus the design is safe. The mass of melon fruit and depodded melon fruit were used to calculate the efficiency. The results obtained showed that an average efficiency of 73.55% was obtained.

Keywords: Design, Simulation, Melon Fruit, Depodding Machine, SolidWorks CAD, Efficiency

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