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DESIGN AND DEVELOPMENT OF AN ABRASIVE PEELING MECHANISM FOR DE-SHELLED COCONUTS

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Coconut plays an important role in sustaining the national economy by contributing 1.4% to the national GDP and 3.4% of annual foreign exchange earnings. Desiccated Coconut (DC) is one of the major export oriented processed products and it accounts for about 0.44% of GDP in Sri Lanka. In the DC industry, almost all the primary processing operations are manual and accounts for high labor costs associated with very high risks. Coconut peeling is one such operation requiring highly skilled labor. When coconut peeling is considered, problems related to capacity, efficiency and price of the machines available are the main constraints at present. Therefore, the objective of this study was to design and develop an efficient coconut peeling mechanism for DC processing.

A prototype of an abrasive peeler was designed and fabricated using the average dimensions of coconuts available at the Baduwatta mill at Katana. The abrasive peeling mechanism was designed using two metal wire brushes of 150 mm and 100 mm diameters and was mounted on two parallel shafts with a 50mm gap between two brushes. These shafts were rotated inwards by a 1 kW single phase motor. A speed controller was used to run the motor at different speeds. When a de-shelled coconut was kept on brushes it rotated around its horizontal axis due to the speed difference of wire brushes. Therefore, the coconut rotates automatically while removing the peel due to abrasion. In the first trial, de-shelled coconuts stuck in between brushes and split opened due to excessive clearance. The second prototype was designed by reducing the gap between rollers and a manually controlled fruit guard frame was designed to control the movement of coconut. In addition, the single phase motor was replaced with a three phase motor coupled with a speed controller for convenient speed control in the final version of the machine. The gaps between brushes were further reduced to 25 mm and the guard frame was further improved for better holding of moving the nut over brushes to improve peeling.

After modifications, the peeling machine performed satisfactorily and splitting of coconuts was minimum below 1000 rpm and the average time taken for peeling a nut was 50 s with 80% peeling efficiency.

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