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### **Design and Development of a Water Melon Juice Extracting Machine**

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As an excellent source of the strong antioxidant vitamin C as well as other antioxidants, watermelon can help combat formation of free radicals known to cause cancer. Tourism hotels and some fruit juice shops in tourism areas use machines such as blenders to extract watermelon juice because of the high demand. They cut small pieces of water melon and then extract watermelon juice without separating all the seeds thus leaving a bitter taste with juice. When trying to remove seeds manually, nutritious part also wasted. The aim of this project is to design and develop a machine to take the juice of watermelon and remove all the seeds and the ring without wasting nutritious part. The requirements were identified and prioritized. Functions that satisfy the prioritized requirements were established. Functions are arranged in the form of a hierarchical structure, the functions tree. With the established functions a morphological analysis was carried out to propose functional solution sub-systems and based on judgment several feasible products were identified. Using a weighted decision matrix, a design solution to proceed with was selected. The selected design consist of a punctured scraper cone, juice collector, rotating shaft, supporting structure, gear box and an electric motor. Design analysis of the component provided the data that were used in the sizing, fabrication and assembling of the machine. Performance tests were carried out each with varying sieve opening diameter using half a watermelon that were introduced into the machine as unpeeled fruit. Time taken for juice extraction, mass of juice extracted, mass of feed sample and residual waste were recorded to get percentage of juice yield, extraction loss and extraction efficiency. Sieve opening diameter of the scraper had a significant effect on the performance indicators. This simple and low maintenance machine can be recommended to small scale watermelon juice processors.

**Keywords:** water melon, functions tree, morphological analysis