

DESIGN AND DEVELOPMENT OF SMALL SIZE OIL EXTRACTING MACHINE FROM GROUNDNUTS

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ABSTRACT

This project is aimed at the design and fabrication of small size oil extraction machine from groundnuts. The objectives are aimed at providing a base for the commercial production of the machine, using locally available raw materials at a relatively low cost. There is so much wastage of these nuts on farms since a negligible portion is consumed by the harvesters. This work is intended to help solve some of the problems hindering a successful design and fabrication of oil extraction machine from groundnuts.

Key words: Nuts, Oil Extraction, Machine, Fabrication

INTRODUCTION

Oil extracting machine is a mechanical assembly for extracting oil from raw materials which are squeezed under high pressure and proper working temperature.

The typical raw materials are groundnuts, seeds like soybeans and so on which are easily available in market and supplied to press in continuous feed.

The conventional traditional method of extracting oil from raw materials is stressful, inefficient and takes longer time which affects on the cost of purely refined oil in market.

It is necessary to provide external temperature near about 353K for harder raw materials to extract oil from them and this affects on the nutrients, vitamins and other important gradients directly.

Nigeria agricultural resources are vast and the progressive harnessing of the resources will result in substantial improvement in output. Nuts generally are economic crops in Nigeria and it has been grown in small plantations in some states like Anambra, Imo, Kwara, Oyo, Edo and Lagos, and to a lesser extent in Ogun, Osun, Delta, Ondo, Niger and other states. For example, in 1994, cashew nuts accounted for N156.1 millions of non-oil export earnings in Nigeria which increased to N743 million in 1995.

There is no doubt that with considerable increase in planted areas and further increase in world demand for cashew, kernels, and the cashew industry will continue to expand. However, despite the increase in production, it is only the cashew nut that is mostly utilized in the processing industry. There

is so much wastage of the fresh cashew apple due to its perishable nature. To reduce this waste, it was thought worthwhile to access the utilization of this material for human consumption in local cottage industries.

This research was set out to establish possible extraction of oil from its nuts and to improve processing procedure, market value and quality of the derived products from the nuts. The overall objective of the work is to design, construct and evaluate the performance of simple and compact equipment for oil extracting machine from nuts.

LITERATURE SURVEY

Aremu A. K et al [1] presented the design of an oil expeller machine for kenaf. The designed machine having the capacity of 36.5 Kg/hr and capable to extracted oil efficiency up to 62.2 %.The designed machine is provided with the best lubrication and easily maintained.

Shankar Haldar et al [2] presented the research study on the information about the oil expellers including the availability of raw materials. This study mainly emphasis on the different issues related with used o oil;expeller its design feature and process and the developing the site for oil expeller industries.

M. Zamanzadeh et al [3] presented the different failures analysis methods and the materials selection for oil expellers. In this research paper various subsets of the design materials are taken in to consideration applicable to the study. This study includes mainly on the failures in the, paints and coatings, plastics and electronics, as well as failure caused by corrosion and principles of root cause determination within that particular field.

Deli S et al.[4] carried out the research study effects of physical parameters in screw press machine. In this study Sativa seeds were studied using a KOMET Screw Oil Expeller. The study is carried out with different sizes of nozzle and at the different speed of shaft, also the different diameter of the shaft is taken into consideration for the study. It is found that the shaft diameter with 8mm shows low yields output but the diameter of shaft 11 mm with speed of 65 RPM shows the good performance. The nozzle size of 12 mm recorded the same percentages of yields. The most of results obtained are varying with the changes in the physical parameters, the optimum conditions of parameters recorded 22.27 % oil yields with 8mm diameter and 19.05% with 11mm diameter of expeller shaft.

S Sreenatha Reddy, et al [5] developed the mini model of the oil expeller screw shaft and finding out the effect with variation of compression ratio of oil chamber along with speed of screw shaft. The experimentation is carried out with Pongamia and Jatropha seeds and the compression ratio is maintained at 14:1 to 21.5:1 with alternating speed of shaft between 35 to 654 RPM. The results of the study concluded that the compression ratios has significant impact on the performances of oil expeller screw.

Adesoji M. Olaniyan et al [6]. designed, a oil expeller screw press and tested with extraction of oil in

palm kernel and soybean. The expeller is powered with 15 Hp three phase motor. The average extraction efficiency of 13.48 and 22.79 % obtained with designed expeller screw. The results concluded that themini expeller can be useful in production of oil for soybean and palm extraction for community.

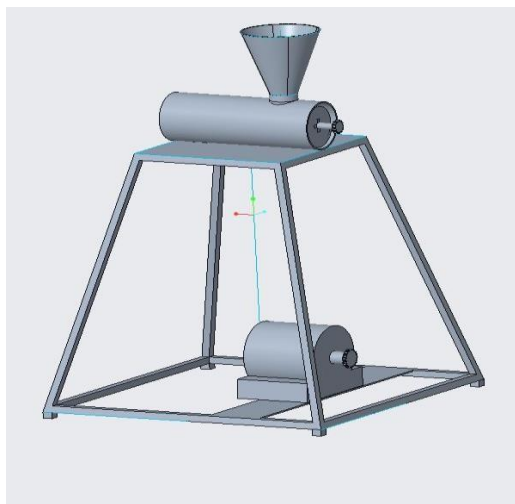
A.Ibrahim et al.[7] carried out the review on the different technologies for oil extraction from agricultural product. The presented study included the used of different techniques for pre-processing conditions including the removal of hulls and shells, pre-processing conditioning such as size reduction, moisture content adjustment, heat treatment and pressure application, as well as the methods employed in the extraction, namely; traditional and modern (improved) methods discussed in this paper

DESIGN AND METHODOLOGY

A. Equipment Description

The oil extracting machine from nuts consist of cylindrical head with feeding hopper, the machine housing(casing), rotating shaft, flange, electric motor seat, bearings and pulley system. The feeding hopper holds the nuts for extracting processes. The material to be used for fabrication were selected after careful study of the desired physical, mechanical and chemical and even aesthetic characteristics of a number of proposed material. The machine housing is also made of 1.5mm mild steel sheet and it houses the rotating shaft. The machine operates with a screw shaft to grind and extract the oil from the groundnuts. The solid drive shaft protrudes out and a pulley fixed at one end.

B. Design



The manufacturing process used in fabrication of the oil extracting machine from nuts is such that the total cost of fabrication is reduced and also one that can make use of the available materials. The manufacturing process involved in this work includes, joining of metal parts by welding, cutting

using hacksaw and hand cutting machine. Each component of the machine is fabricated separately before joined or welded together as the case may be.

The following are the procedure of fabrication of each component of the machine and final assembly.

1. **Raw materials:** A raw material is the basic material used in the productions of the goods, finished products. The term “raw material” is used to denote material which is unprocessed.
2. **Marking:** Marking is the process of making visible impressions on the metal surface so that required operations can be carried out as per the dimensions
3. **Cutting:** The raw material cut into the required dimensions using a grinding wheel cutter. Metal cutting is done by a relative motion between the work and piece and the hard edge cutting tool, which is multi point cutting tool.
4. **Welding:** The assembly of base table is done by the process of welding. In this case the process is done by “Arc Welding”. Arc welding is type of welding that uses a welding power supply to create an electric arc between an electrode and the base material to melt the metal at the welding point. They can use either direct or alternating current, and consumable or non-consumable electrode.
5. **Drilling:** Drilling is easily the most common machining process. Drilling involves the creation of holes that are right circular cylinders. This is accomplished most typically by using the twist drill. The chips must exit through the flutes to the outside of the tool. The cutting front is embedded within the work piece, making cooling difficult. The cutting area can be flooded, coolant spray mist can be applied, or coolant can be delivered through the drill bit shaft.
6. **Hand Grinding:** Hand Grinding is the finishing process used to improve surface finish, abrade hard materials, and tighten the tolerance on the flat and cylindrical surface by removing the small amount of material. In grinding the abrasive material rubs against the metal part and removes the tiny pieces of material.

CONCLUSION

The oil extracting machine from groundnuts was fabricated from the available locally applicable for local production, operation, repair and maintenance. The operation of the machine which could be manually or electrically operated makes it unique type compare to others. The automatic operation of the machine saved energy and did not required high skilled labour. Finally, the operation is simple, save time and energy.

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