

Automatic Oil Expeller Machine

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Abstract: The goal of this project is to design and build a machine that will extract oil from nuts. The objectives are to lay the groundwork for the machine's commercial manufacturing using cheap, readily available raw materials in the area. There is a significant amount of wastage of these nuts on farms because only a small portion of them are consumed by the harvesters. This project aims to help in the resolution of various problems that prevent the successful design and production of a machine to extract oil from nuts. The material from which oil has been expressed that remains after leaving the equipment is known as the cake. The expeller screw, which receives seeds continually, smashes, presses, and grinds the seeds to extract the oil. Designing and creating a machine that will extract oil from nuts is the aim of this project. The goals are to lay the framework for the machine's commercial production utilising inexpensive, locally accessible raw materials. Because only a small portion of these nuts are eaten by the harvesters, there is a significant amount of waste of them on farms. With the help of this project, several issues that obstruct the successful design and manufacture of a machine to extract oil from nuts will hopefully be resolved.

Keywords: threshing rotor, hopper, pulley boring, mesh, frame.

1. Introduction

Coconut, sesame, sunflower, rice, canola, camelina, soybeans, sugar cane, wood, and rapeseed seeds can all be used to make oil. Yet, it is difficult to directly and quickly obtain oils from these sources. To keep them usable, they must be removed using a procedure with specific purity requirements. The two most prevalent extraction methods now are mechanical and chemical extraction [1]. An oil expeller is a machine that rotates the feed to the expeller screw either manually or mechanically to create pressure. A mechanical technique for extracting oil from raw materials is the screw press method. Screw pressing is a method of extracting oil that is utilised in both the food and industrial sectors. Raw oil is used in dressings and is converted into a variety of food products, such as maize oil, peanut oil, rice bran oil, etc. Low oil recovery while processing untreated seeds is one of the drawbacks of screw pressing. Yet, the main issue is that it can be utilised for low output and needs less money. RBD oils, often known as refined, bleached, and deodorised food oils, are commonly available in markets [2] In the screw press method, seed is contained in a barrel through a hopper, and oil is extracted by applying enough force to the contained seed. Under these circumstances, the pressure is so great that it causes the cells to burst, releasing the oil within the

seed. The process of extraction involves compressing the material in a container with tiny holes either round or slotted that permit the liquid component to escape. The cake is the leftover portion of the material from which oil has been expressed that leaves the apparatus. The expeller screw, which is continuously fed seeds, grinds, crushes, and presses the oil out of the seeds as they move through the machine.

2. Research Methodology

The revolving worm of the oil expeller machine is to force the oil seeds and nuts firmly through the barrel. Worms put greater pressure on the seeds, forcing the oil to flow out and escape through the perforations. After pressing, crude oil and oil cake are obtained. The oil expeller was constructed of mild steel, which was easily accessible in the area. Before the oil expeller was built, the reliability of the stress test was designed and tested in Ansys. Rectangular bars were added after the oil extraction barrel was created since they only allow oil to pass through and boost pressure inside the barrel. The choke mechanism was installed at the extraction barrel's screw output. A reduction gear was utilised to lower the motor's rpm and boost the energy in the screw shaft. the V-belt that transfers power. The rotating worm of the oil expeller machine must forcefully push oil seeds and nuts through the barrel. Worms put greater strain on the seeds, squeezing the oil out and releasing it via holes. Crude oil and oil cake are obtained after pressing.

A. Gear Box

Heavy duty taper roller bearings are included in the double reduction gearbox assembly to withstand crushing radial and axial loads.

B. Main Shaft

a special hollow drive sleeve configuration that makes it easy to remove the primary worm shaft without harming the gear box assembly. Additionally, a water-cooling system is provided for better quality oil and cake. main shaft, worms, and alloy steel.

C. Electric Motor

Expeller drive with Slip Ring Electric Motor with unique starter-slow start up with reversible switch panel board,

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minimal wear and tear, restart is simple due to power outage.

D. Applications of Optimization Techniques

- New concept development literature review.
- Mechanical design and dynamic analysis.
- A Comparison of the current working model with other operational machines.
- Create a machine itself using the machine's parts Cost evaluation.

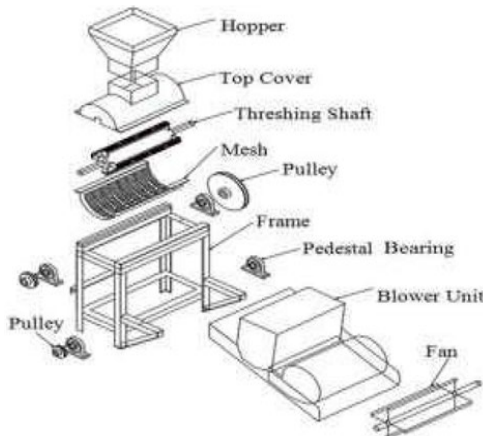


Fig. 1. 3D model of oil expeller machine

E. Objectives

- To put in place hardware for a specific topology.
- To create a machine for pressing oil.
- To create an automatic oil-peeling machine.
- Designing an oil expeller unit.
- To create automatic oil expellers that are affordable.

3. Literature Review

Oil extraction is the process behind many important products made from agricultural resources, such as peanut butter, coconut oil, CBD products, and scented soaps. These items require an oil extraction equipment to be produced. A versatile kind of equipment, oil extraction machines support agricultural

These expeller pressers typically use a screw mechanism to squeeze the oils of various materials, using heat, friction, and pressure.

Typically, an oil extraction machine will employ a screw press. Before going through the screw press, some items, like groundnuts, need to be shelled or peeled. Strong centrifugal forces or fan airflow may be used during the peeling process to separate the lighter shells from the heavy nut. The product is supplied into the screw system, which consists of a screw inside a high-pressure cylindrical chamber, after it has been peeled. As the material is screwed through, heat and friction are produced. Both heat and high pressure work together to extract the majority of the oil. Some of the product's proteins may be denatured, and the oil's viscosity may be increased for better movement. In order to ensure that no particles or fibres accompany the oil as it is pushed out, it seeps the screen or filter. This results in a polished, tidy output. The remaining squeezed seeds from a tough cake are taken out of the machine,

and the oil pours into a different container. Harder items, such nuts, generate more heat than softer ones, like fruits, and the heat produced in this process might have adverse effects on some materials. to counter the increased heat.

Advantages:

- Simple to operate.
- The construction is simple.
- Minimal weight easily maintained.
- Portable

4. Details of Implementation

A. Hopper

A hopper is a large, inverted pyramidal or conical container used in industrial processes to store and disperse particulate matter or flowable material of any sort (for example, dust, gravel, nuts, or seeds) from the bottom. In some specialist applications, tiny hopper systems may load and distribute small metal or plastic assembly components. In the case of dust collecting hoppers, dust can be collected from expelled air. Hoppers for dust collection are typically grouped in groups to enhance the amount of dust collected. Hoppers are used in a number of industries to store products such as flour, sugar, or nuts for food production, animal feeding pellets, crushed ores for refining, and so on.

B. Expeller Pressing

The mechanical extraction of oil from raw materials is known as expeller pressing (also known as oil pressing). In a single process, the raw ingredients are crushed under tremendous pressure. When used to extract food oils, common raw materials include nuts, seeds, and algae, which are continuously fed into the press. Friction heats the raw material as it is pressed.

C. Motor Driver

A pulley is a wheel on an axle or shaft that is designed to facilitate movement and direction change of a taut cable or belt, as well as power transfer between the shaft and the cable or belt. A pulley supported by a frame or shell that does not deliver power to a shaft but is used to guide the cable or apply a force is referred to as a block, and the pulley is referred to as a sheave or pulley wheel.

D. Frame

A frame is frequently a structural framework that supports other components of a physical building and/or a steel frame that restricts the scope of the construction.

E. Pedestal Bearing

A pillow block bearing (or plummer block) is a pedestal that supports a spinning shaft using appropriate bearings and additional attachments. The assembly is made up of a mounting block that houses a bearing.

F. Fan

A fan (machine) is a machine that produces airflow and is frequently used for cooling. A hand fan is a device that is held and waved in order to circulate air for cooling. Fan (person),

short for fanatic; a fan or supporter, particularly of entertainment.

5. Conclusion

In this research endeavour, a machine for seed extraction was built. The customer is satisfied with the high-end performance of this automated equipment after fabrication. The extraction machine is made up of standardised components that are easy to get on the market and to develop. After being taken out of the machine, the pulp and seeds might be put to use as resources. In agricultural nations, the lack of affordable and effective solutions for domestic oil production is extremely noticeable. An ideal answer to these particular issues is provided by modified household oil expellers. From user surveys to manufacturing procedures, every stage of the product design process was meticulously adhered to. To improve the design parameters, an analysis of the experiment's design using the Taguchi design method was carried out. The home oil expeller was then evaluated. against various parameters, and it was

shown from the findings that rotating speed, heating temperature, screw shaft length, and pitch diameter all significantly affect oil extraction efficiency.

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