Design And Fabrication of Oil Remover From Fast Food

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Abstract- *Fried foods are delicious and enjoyed by almost everyone. However, they are not the healthiest foods to eat because of the amount of oil they contain. We are intends to determine whether a simply designed centrifugal system can remove a reasonable amount of oil from fried foods after it has been deep fried without adversely affecting the texture of the fried food.*

Due to a large variety in the texture as well as the type of fried foods, and in order to keep the scope of this project more focused and feasible, the focus of this project will be fast food. Designs for the system were made on solid works. The results indicate whether an oil remover will remove a reasonable amount of oil while also considering the integrity of the fast food. The study concludes that centrifugation is being a cost-effective method for removing oil from fried foods.

Keywords- oil remover

I. INTRODUCTION

Deep frying food has been around for decades because it enhances the flavor of the food while creating a crisp outer layer during the cooking process. Throughout the deep frying process, food experiences mass and heat transfer. Mass is transferred into the food via the medium it is fried in; generally oil or lard. Heat is transferred to the fried food by way of convection and into the core by conduction. Unfortunately, consistently consuming oil or lard from deep fried foods may cause health issues in the long run. Thus, the purpose of this is to remove a reasonable amount of oil from fried foods. This study will focus on the popular French Fries. The reason for narrowing down the study to one type of fried food is because every food that is fried generates a different type of crust which can make it easier or more difficult to extract oil. The method that was studied consisted of a centrifuge (rapidly spinning container). This way, one can enjoy the tasty French Fries while worrying less about consuming excessive oil or lard.

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Most of the fast food are fried, while preparing this type of food by using traditional methods this kind of food are oilier. By using traditional utensils while frying the oil use for frying remains in the food. Due to this method oil remove from fast food is about 20 to 30 percent. Due to plenty of oil available in food, after some time the food does not taste well and more oil in the food may be harmful from human body.

II. LITERATURE REVIEW

Yufay Chow-Yee, Deep frying food has been around for decades because it enhances the flavor of the food while creating a crisp outer layer during the cooking process. Throughout the deep frying process, food experiences mass and heat transfer. Mass is transferred into the food via the medium it is fried in; generally oil or lard. Heat is transferred to the fried food by way of convection and into the core by conduction. Unfortunately, consistently consuming oil or lard from deep fried foods may cause health issues in the long run. Thus, the purpose of this is to remove a reasonable amount of oil from fried foods. This study will focus on the popular French Fries. The reason for narrowing down the study to one type of fried food is because every food that is fried generates

a different type of crust which can make it easier or more difficult to extract oil. The method that was studied consisted of a centrifuge (rapidly spinning container). This way, one can enjoy the tasty French Fries while worrying less about consuming excessive oil or lard.**[1].**

Govind Tagal pallewar, For decades, consumers have desired deep-fat fried products because of their unique flavour-texture combination, ranging from potato chips, French fries, doughnuts, extruded snacks, fish sticks, and the traditional-fried chicken products. Frying is one of the oldest and most popular cooking methods in existence. Frying in vacuum condition is a new technology that can be used to improve the quality of fried foods because it is working in low temperatures and use the minimum oxygen content. Deep-fat frying is a method to produce dried food where an edible fat heated above the boiling of water serves as the heat transfer medium, fat also migrates into the food, providing nutrients and flavour These conditions lead to high heat transfer rates, rapid cooking, browning, texture ,and flavour development. Therefore, deep-fat frying is often selected as a method for creating unique flavours, colours, and textures in processed fried foods. However, surface darkening and many adverse reactions take place during deep-fat frying because of high temperature. Due to the pressure lowering, the boiling points both of the fat and Moisture in the foods is lowered.**[2].**

AtifMulani, Although uncommon, there are few machines that are specifically made to remove oil from fried foods. They are giant centrifuges made of stainless steel that can be purchased from Alibaba. Alibaba is a platform for global wholesale trade. Some unique features about this centrifuge is that is can spin up to 1500 rpm and have a capacity of up to 7kg as advertised on Alibaba. Even though these exist, they may not work well to produce visually appetizing final products for all types of fried foods. For instance, from the study mentioned in at higher angular velocities, fried chicken did not look appetizing. This may be the case for various types of fried foods. As for fries, the conclusion will be determined as a result of this thesis.**[3].**

Abdul-Akaba Tijani, The project is aimed at the design and fabrication of oil extraction machine from nuts. 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 nuts. **[4]**

Vishal Kumar, A centrifugal clarifier based on the principles of a hydro cyclone with an impeller was developed for centrifugal clarification of sugarcane juice, for improvement in the quality of jiggery and khan sari. The developed clarifier and an existing standard sedimentation disc centrifuge were tested in regards of effect of operational parameters, namely, settling, boiling, clarificant addition and sampling time/ juice volume on their performance.**[5]**

Rohan John, Deep frying is the oldest and most popular cooking methods in existence. Frying in vacuum condition is a technology that can be used to improve the quality of vacuum fried snacks because it is done in low temperatures and use minimum oxygen content. Vacuum fried snacks are popular in South-East Asian nations. This popular alternative food technique has made food technologist, scientists and professors in India to take this to large scale food processing enterprise **[6]**

III. DESIGN OBJECTIVES

The basic design objectives of this project work are as follows.

[1] To study concept of oil removing machine.
[2] To study about power and RPM of motor.
[3] To manufacture and design the machine which remove oil from fast food.
[4] To select pulley, shaft, motor, sieve for project.
[5] To produce stand that can sustain load of motor and other component.
[6] To produce machine which give more performance at effectively low cost.
[7] To minimize the overall operation and production cycle time.
[8] To reduce labor cost.
[9] To separate high viscosity oil.

IV. METHODOLOGY

Centripetal force is defined as, "the force that is necessary to keep an object moving in a curved path and that is directed inward toward the center of rotation," while centrifugal force is defined as "the apparent force that is felt by an object moving in a curved path that acts outwardly away from the center of rotation," according to Merriam Webster Dictionary.

The centrifugal force is an inertial force (also called a "fictitious" or "pseudo" force) that appears to act on all objects when viewed in a rotating frame of reference. It is directed away from an axis passing through the coordinate system's origin and parallel to the axis of rotation. If the axis of rotation

passes through the coordinate system's origin, the centrifugal force is directed radially outwards from that axis. The concept of centrifugal force can be applied in rotating devices, such as centrifuges, centrifugal pumps, centrifugal governors, and centrifugal clutches, and in centrifugal railways, planetary orbits and banked curves, when they are analyzed in a rotating coordinate system. The term has sometimes also been used for the reactive centrifugal force that may be viewed as a reaction to a centripetal force in some circumstances.

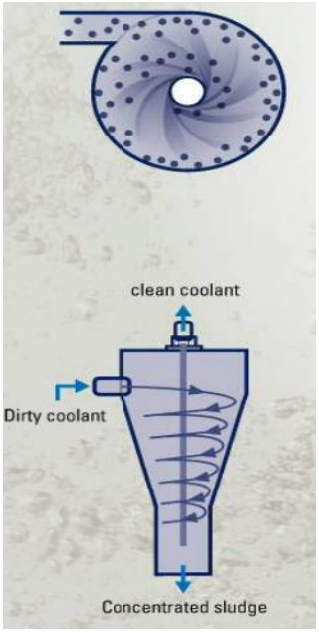

Figure 1: Centrifugal Force Concept

V. COMPONENT FUNCTION AND SPECIFICATIONS

[1] Pulley:

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave.

Photograph: **Pulley**

[2] Belt:

V belts solved the slippage and alignment problem. It is now the basic belt for power transmission. They provide the best combination of traction, speed of movement, load of the bearings, and long service life. They are generally endless, and their general cross-section shape is roughly trapezoidal (hence the name "V"). The "V" shape of the belt tracks in a mating groove in the pulley (or sheave), with the result that the belt cannot slip off. The belt also tends to wedge into the groove as the load increases—the greater the load, the greater the wedging action—improving torque transmission and making the V-belt an effective solution, needing less width and tension than flat belts. V-belts trump flat belts with their small center distances and high reduction ratios.

Photograph: Belt

[3] Bearing:

A linear motion bearing or linear slide is a bearing designed to provide free motion in one direction. There are many different types of linear motion bearings. Motorized linear slides such as machine slides, X-Y tables, roller tables and some dovetail slides are bearings moved by drive mechanisms. Not all linear slides are motorized and non-motorized dovetail slides, ball bearing slides and roller slides provide low-friction linear movement for equipment powered by inertia or by hand. All linear slides provide linear motion based on bearings, whether they are ball bearings, dovetail bearings, linear roller bearings, magnetic or fluid bearings. X-Y tables, linear stages, machine slides and other advanced slides use linear motion bearings to provide movement along both X and Y multiple axis.

Photograph: Pulley

[4] Shaft:

A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power. The various members such as pulleys and gears are mounted on it. The material used for ordinary shafts is mild steel. When high strength is required, an alloy steel such as nickel, nickel-chromium or chromium-vanadium steel is used. Shafts are generally formed by hot rolling and finished to size by cold drawing or turning and grinding.

Photograph: Shaft

[5] Feather Key:

In mechanical engineering, a key is a machine element used to connect a rotating machine element to a shaft. The key prevents relative rotation between the two parts and may enable torque transmission. For a key to function, the shaft and rotating machine element must have a keyway and a key set, which is a slot and pocket in which the key fits. The whole system is called a keyed joint. A keyed joint may allow relative axial movement between the parts.

[6] Motor:

An AC motor is an electric motor driven by an alternating current (AC). The AC motor commonly consists of two basic parts, an outside stator having coils supplied with alternating current to produce a rotating magnetic field, and an inside rotor attached to the output shaft producing a second rotating magnetic field. The rotor magnetic field may be produced by permanent magnets, reluctance saliency, or DC or AC electrical windings.

Less common, AC linear motors operate on similar principles as rotating motors but have their stationary and moving parts arranged in a straight line configuration, producing linear motion instead of rotation.

Photograph: Motor

[7] Container:

A steel can, tin container, steel packaging, or can is a container for the distribution or storage of goods, made of thin metal. Many cans require opening by cutting the "end" open; others have removable covers. Cans hold diverse contents: food, beverages, oil, chemicals, etc. Steel cans are made of tinplate (tin-coated steel) or of tin-free steel. In some dialects, even aluminum cans are called "Container".

Steel and aluminum packaging offer 100% barrier protection against light, water and air, and metal cans without reseal able closures are among the most tamper-evident of all packaging materials. Steel cans preserve and protect the product from damage by light, oxidation, extremes of temperature and contamination, safeguarding flavour, appearance and quality from factory to final consumer. Food and drink packed in steel cans has equivalent vitamin content to freshly prepared, without needing preserving agents. Steel container also extends the product's shelf-life, allowing longer sell-by and use-by dates and reducing waste.

As an ambient packaging medium, steel cans do not require cooling in the supply chain, simplifying logistics and storage, and saving energy and cost. At the same time, steel's relatively high thermal conductivity means canned drinks chill much more rapidly and easily than those in glass or plastic bottles.

Photo: Poured Container

Photo: Steel Container

[8] Frame:

It's made up of mild steel. Its length is 58cm, width is 35cm and height 48cm .Its supported to the pulley and belt assembles. And also motor is fixed on the frame. The frame is light weight so it's easy to transfer.

Photograph: Frame

VI. WORKING PRINCIPLE

In Oil Remover Machine, we used centrifugal force to remove oil form the Fast Food. We used a poured container to remove oil. The poured bucket is covered with a plain container to collect extracted oil from the Food. A motor of 0.5 HP is used for rotating the poured container by creating the centrifugal force. The rotational movement of motor shaft is transferred to the poured container shaft with the help of V-Belt and Pulley attachment. To avoid the rotation of Outer container Bearing is placed at the point where the shaft is connected to Outer container, all the components are assembled on the Frame.

When the Oil Remover Machine is started, the electrical energy of motor is converted into the mechanical energy of the shaft. This mechanical energy is transmitted to shaft attached to the poured container with the help of Belt and Pulley arrangement. The rotation of the motor results in the rotation of the container. Due to this rotation, centrifugal force is created in the container. If the container is filled with fast food, the food strikes on the wall of poured container. This results in removing the excess oil present on the surface of the food. The particles of oil are thrown out of the container through the pours. The removed oil is collected using the outlet.

Photograph: Oil Remover

VII. PERFORMANCE SUMMARY

Advantages:

[1] This Machine reduces the quantity of oil present on the surface of fast fod.
[2] Increase the productivity.
[3] Less Maintenance.
[4] It is portable hence we use it at any place.
[5] It increrase the life spean of food.
[6] Increase the quality of product.

Limitations:

[1] Belt need to be change after some time.
[2] Its need an external power supply.
[3] Required preventive maintenance.

Applications:

[1] To remove excess oil from fast food.
[2] To separate chip and coolant.

Future Scope:

The issue is that fried foods are extremely popular. The downfall of consuming excessive fried foods is various health issues. In order to reduce the amount of oil in fried foods, there may be alternative frying mediums that have not been discovered or utilized, or alternative cooking methods. In an attempt to attack the problem from a different angle, the solution could lie more so in the food science department and less in the engineering department or could require cooperation between both schools of thought. An alternative method could be designed similar to the air frying method that was introduced in the literature review.

VIII. CONCLUSIONS

Project is an economic means for the oil removing from fast food which may of great help human being. It will provide alternative advance and modern method of oil removing for traditional method. The project model can make their task much easier.

By using traditional methods only 10 to 15 percent of oil is removed. Using this method of oil removal 20 to 30 percent of penetrated surface oil is removed.

The goal of this project work was to prove if a reasonable amount of oil could be removed from fries by using a centrifuge. A repurposed salad spinner with a DC motor was used to run the experimentation. This allowed for easy manipulation of the angular velocity and duration of each trial. Additional analysis was gathered on the design of the project, including heat transfer and vibration calculations.

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