



Spinner Machine for Walasoji Shredded Fish: Designing and Manufacturing

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Abstract. The water in the oil causes a hydrolysis process that produces free fatty acids and causes a rancid odor on the shredded. Therefore, shredded fish can be appropriately drained. The conventional draining process is challenging to minimize the oil content in the shredded. The draining stage is essential in making shredded with the demand for quality, dry and durable products. The paper's purpose was to design and manufacture a spinner machine with a capacity of 3 kg. It has produced a spinner machine with 3 kg of process from designing and manufacturing. The device uses an electric motor with a power of 70 W. The test results show that the oil draining machine can work well following its function, draining the oil in the fried shredded fish.

Keywords: Spinner · Machine · Design

1 Introduction

Shredded fish is a product of variations in the processing of fish meat. The BCL-SF group, which is a partner of the research team, produces shredded fish with the following stages: (1) preparation of materials and equipment, (2) boiling fish and providing spices, (3) mixing fish, (4) frying, (5) draining, (6) packaging. Raw materials such as.

walasoji fish, shallots, garlic, coriander, brown sugar, cinnamon, vinegar, and cooking oil are obtained from the Pangkajene Sidrap Central Market. The fish is boiled using a cooking pot and gas stove. The boiled fish is pounded using a stone mortar. The mixing process with spices is followed by frying. The frying equipment is a frying pan and gas stove. During frying, the mixture is turned over until it turns brown. Then drain to separate the oil from the shredded fish. Drain using a flat tool by hand. The process that requires a lot of energy and a long time is the frying and draining process. Causing the production capacity is still low, and the quality of shredded fish still needs to be maximized. One that affects the taste and shelf life of shredded fish is the oil contained in the shredded fish. The water in the oil causes a hydrolysis process that produces free fatty acids and causes a stinky smell to the shredded. Therefore, shredded fish must be appropriately drained. The conventional draining process is challenging to minimize the



Fig. 1. Spinner machine of cooking oil [4].

oil content in the shredded [1–3]. The draining stage is essential in making shredded with the demand for quality, dry and durable products. The fish floss produced is still marketed locally in the Pangkajene area.

This high oil content needs to be removed using the draining process. There are two methods in the draining process: manually and using machines. An oil-draining machine is a machine that reduces the oil content in chips or other foods and improves the quality of chips to make them last longer. An oil-draining device with a rotary system can quickly reduce the oil content in chunks. If the oil or water content is high, the draining process can be done again. The components of this oil-draining machine consist of an electric motor, an outer tube, an oil-draining line, and a frame to support the machine [4] Fig. 1.

Currently, there are lots of shredded sellers selling various flavors of shredded meat to be enjoyed by the public, both on a small scale and a large scale. Therefore, this oil-draining machine plays an essential role in draining the oil on shredded meat with a small capacity for home production. On this basis, researchers are interested in designing and manufacturing an oil-draining machine with a total of 5 kg and using an electric motor as a driving force. In this study, researchers conducted the process of designing and developing a product. The design process is an initial activity of a business in realizing a product whose existence is needed by the community to improve their welfare [5]. In a design, especially the design of machines, many use a variety of knowledge that must be applied. These sciences are used to get a good, precise, and accurate method following what is expected. The applied sciences generally include mathematics, materials science, and engineering mechanics.

This research aims to design and manufacture an oil-draining machine with a capacity of 5 kg for one process. In this study, the oil draining device that will be created and manufactured is equipped with a speed controller so that this machine can be used at a speed suitable for the needs to produce good draining results but does not damage the shredded meat.

The sea fish known to the Sidrap community as walasoji fish is one type of marlin, namely the blue marlin. Walasoji Blue Marlin (WBM) fish can be a good source of protein for the body. This fish is rich in vitamin B3, vitamin B6, vitamin B12, and selenium and is also a good source of iodine and magnesium. It is suitable for those who want to lose weight because it is low in calories but has good protein. WBM contains 100 g of calories, 40 mg of cholesterol, 35 mg of Sodium, 26 g of protein, and total fat of 0.4 g. The benefits of WBM include the following:

1. Preventing cardiovascular disease.
2. Preventing arthritis.
3. Reducing the risk of dementia.
4. Mouth and skin cancer.
5. Sensory, cognitive, and motor development.
6. Reducing the risk of depression.
7. Improve brain health.

While the side effects: (a) contain heavy metals, (b) poisoning, (c) allergies. To eliminate these side effects, choose fresh marlin fish, then process by boiling or roasting [6].

One of the methods used to separate a mixture into two or more parts is to apply the principles of centrifugal force and centrifugal force. These two forces will divide the mix with the mass of the part, where the group of the heavy part will be thrown away from the rotating shaft, while the group of the light part will stay closer to the rotating shaft. This method is more efficient and requires a shorter time than the deposition method. The centrifugal force on a particle is forced to rotate along a circular path is expressed in the following equation [7]:

$$F_c = m.r.\omega \quad (1)$$

where F_c = centrifugal force (N), m = particle mass (kg), r = shaft radius (m), ω = angular velocity (rad/s).

The motor power used can be determined by applying the following equations [5]:

$$P_d = P.f_c \quad (2)$$

$$P_d = T.\omega \quad (3)$$

where: P_d = Design power (W), P = Nominal power (W_0), f_c = Power correction factor, and T = Torque (N.m).

2 Research Methodology

This research was conducted at the Mechanical Laboratory of the Department of Mechanical Engineering at the Politeknik Negeri Ujung Pandang. The method in this research can be seen in the flow chart below in Fig. 2. This flow chart model is also used in the following research [8–10].

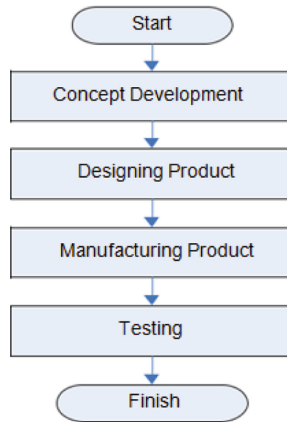


Fig. 2. Flowchart for Designing the spinner machine.

2.1 Preparation of the Draft Concept

Drafting the concept is needed in a product design to determine the ideal design model and to determine the parts and mechanisms required to build a product to be produced. At this stage, the researcher will select the model or shape of the oil draining machine according to a capacity of 5 kg and the selection of parts and mechanisms or systems that will be used to build the oil draining machine and the choice of components for the oil draining machine. The drafting of the concept will consider the durability and strength of the machine [11], ease of manufacture [12], cost and ease of use [13, 14], availability of raw materials [15, 16], efficiency and effectiveness of machine performance [17].

2.2 Process of Designing Product

In this stage, the researcher designs a product based on a predetermined design concept. This design is carried out by determining the size or dimensions and the material used for each component by considering the machine's strength, durability, and safety. In determining the dimensions and sizes of each element, especially the shaft, pulley, and belt parts, the researchers carried out designs based on references from several machine element design books [4, 5]. It is intended that the dimensions or dimensions of the components resulting from the design can meet safety standards and meet the scientific rules of a product design.

2.3 Process of Manufacturing Product

Product manufacture is the process of building a product from a product design that has been produced. The product manufacturing process is a critical and crucial stage because will be determined the success or failure of a product at this stage. This product uses a manufacturing process that follows the components to be made, such as in the manufacture of shafts using the lathe process or in the manufacture of frames using the welding process. At this stage, all components and parts that will be made are based on the design results.

2.4 Process of Testing Product

The testing process is carried out to determine whether the oil draining machine that has been made can work appropriately according to its function, namely draining oil on food or shredded. The testing process is also carried out to determine the engine performance by looking at the relationship between the draining time of the drained oil with variations in the speed of different engine rotations. The measurement of drained oil was carried out through the weight of the initial sample before. Drained it minus the piece's importance after draining, then divided by the weight of the work before draining. Calculation using the following equation [18]:

$$K_m = \frac{P_1 - P_2}{P_1} \quad (4)$$

where: K_m = Oil drained (%), P_1 = Weight of Sample before draining (grams), and P_2 = Weight of Sample after draining (grams).

3 Results and Discussion

3.1 Result of Designing Product

The design of this oil draining machine is determined based on various considerations as follows:

- This oil draining machine does not use human propulsion as the main driver, but is replaced with electric motor power.
- This oil draining machine uses a speed control regulator so that the speed of this machine can be adjusted to produce the best draining results.
- Ergonomic machine specifications with dimensions that are comfortable for the operator and easily adapted to the workspace.
- Easy to operate, maintain and replace spare parts.
- This oil draining machine does not cause air pollution.
- When operating, this machine does not make a very noisy sound.

Based on the construction design of the oil draining machine that has been described previously, the design model of the oil draining machine is obtained Fig. 3.

3.2 Result of Manufacturing Product

The manufacturing process of making a shredded fish slicing machine is performed based on the results of designs that have been made previously. The process of making this draining machine is carried out at the PNUP Mechanical Workshop which involves students Fig. 4. The stages in the process of making an oil draining machine consist of several stages, namely as follows:

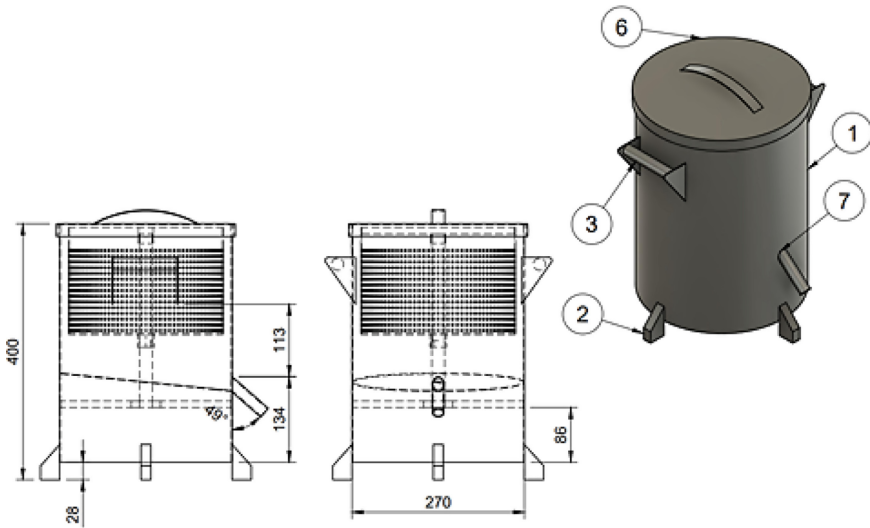


Fig. 3. Design of spinner machine. Decription: (1) Tube, (2) Foot, (3) Handle, (4) Filter, (5) Cover, (6) Faucet, (7) Axis.



Fig. 4. Manufacturing the spinner machine.

- Frame Making
- Outer Tube Making
- Filter Making
- Shaft Making
- Assembly Process
- Finishing Process

3.3 Discussion

Oil draining machines that are widely sold in the market are primarily for industrial scale. Thus, they are used for a home scale because they are large, expensive, and inefficient.

Finally, not an option to have. Many people need clarification about how to drain the oil in their processed food to maintain quality. The technology applied is much more efficient than the conventional way of squeezing oil using the power of human hands. The working system of this oil-draining machine adopts the operating system of draining water on clothes washing machines and rotating axle gears on motorized vehicles. With the adoption of the engine system, the gear ratio is obtained, which is the ratio of the inner gear to the outer (crank) to produce rotation. The gear ratio is estimated at 12 [18]. Based on the results of the spinner machine, it can be obtained that there is no significant difference between the planned design and the manufacturing results.

4 Conclusion

Based on the design and manufacturing process, the results have been designed and made one unit of an oil draining machine with a capacity of 3 kg for one approach. This machine uses an electric motor with a rotation of 450 rpm and a power of 70 W as the driving force. Indirect transmission system using V A25 belt. The test results show that the oil draining machine can work well following its function, namely draining the oil contained in the fried shredded fish.

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