Design Build Dryer Machine Frying Results Nuts Eggs

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ABSTRACT

The purpose of this research is to design oil drying machine in nurts eggs to get the result of working drawing and to determine the peanut dryer component. The concept of planning oil drying machine in nurts eggss is by conducting a direct survey of the egg industry, the problems arise still high levels of oil in manually dried peanuts, then carry out the design concept. Based on the concept, then designed a design drawing. The result of this final task is in the form of design or design of oil oven dryers that utilize centrifugal force for drying oil, oil stainless steel rotary tube components, stainless steel container tube with stainless steel, axle components to support tubes of 22mm diameter and 520mm length, pulleys with a 3/6 ratio as a rotary reducer of an electric motor of 0.5 HP 1400 rpm to 500 rpm. Frame profile machine L 40 x 40 x 4 mm 42 st material and engine components made by Fernando Ferry from material st 37.

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1. INTRODUCTION

Indonesia as an agricultural country has many natural resources that can be managed and utilized by the community to improve the welfare. The welfare of the Indonesian people can be improved through the field of industry, especially small industries such as home industries, therefore it is necessary to increase the means or equipment related to the processing of products in the household industry, for example in the egg industry. Egg nuts use raw materials from peanuts which is one of the main commodities of natural resources of the people of Indonesia. Egg drying process is still using conventional way that is dried naturally by being placed in a container of wire strimin then diangin-aired. The weakness of drying in this way is that the egg nuts are produced faster apek, the production time becomes longer and the resulting product is limited although the peanut farming is very abundant because the oil content is still high so it is not durable. The following is data of peanut production amount in West Sumatra from 2012-2013 based on BPS (Badan Pusat Statistik) of year 2013.

Table 1 : Number of Peanut Production in West Sumatera.

Commodities	Year	Productivity (ku/Ha)	Production (ton)
Kacang Tanah	2012	14,07	9597
	2013	16,98	9852

Based on data as in table 1 shows peanut production results in West Sumatra from year to year increased. Peanut commodity productivity increased by 2.91 quintals per hectare, this also affected peanut production increased by 255 tons. Peanut production results are increasing each year so it needs to be improved processing using cheap peanut raw materials but the selling price after processed profitable large. A real example of peanuts as a processed product, because the egg beans use peanut raw materials price per kg Rp. 22.000 after being processed into eggs the price becomes Rp. 45.000 per kg. Based on direct observation the market conditions indicate one of the owners of home industry in Lapai Padang area. The owner purchases the required raw materials at market prices and works from the initial process of making, frying, drying until the packaging process can produce 8 kg and last only 2 weeks, the process takes 50 minutes for drying conventionally ready to pack. Under these circumstances' solutions must be found in order to produce fast peanuts and low oil content so that it is durable.

Seeing this, the authors are compelled to make a tool or equipment useful in the process of drying the egg beans so that the eggs produced with low levels of oil and a fast time. The use of egg-peanut dryers is the answer to the above problem. Egg production with egg-peanut dryers provides a multi-fold advantage over conventionally aerated peanut egg production. The use of egg bean dryer, producing 8 kg of egg beans only takes 20 minutes, while conventionally producing 8 kg of egg beans takes 50 minutes. Based on these comparisons, peanut oil dryers are best used for small amounts of egg peanut production and quick peanut drying. This drying machine uses centrifugal force to dry the oil. How it works ie egg beans will be rotated in the dryer tub so that the oil will be sliced and out through the hole in the dryer tube. It is expected that with this egg bean machine, the home industry will be lighter to work and can improve the productivity of its work with quality results. This made-made egg bean machine is a modification of an existing egg bean dryer. The difference of the current machine with the previous machine such as:

1. Egg-dispensing system with removal of rotary tube.
2. Smaller tube volume.
3. The addition of the upper frame lock to keep the spindle stable.

1.1. Nuts Eggs

Snacks are foods that are intended to eliminate a person's hunger for a while. One of the most popular snack foods is egg nuts. Egg nuts are dough flour that is processed and then wrapped with peanuts then fried. Because the processing is simple and does not take time long, then many people are interested in opening this business. Egg snack business is quite popular by hunters home-based business. In fact we can see along the main road in the city of Padang, many outlets that sell snacks with a variety of flavors and basic ingredients. This development is due to the high demand of the snack food (the desire to snack) and the people's desire to enjoy the different flavors the producers offer on food with attractive appearance and reasonable price. Egg nuts are light snacks made from peanuts wrapped in flour fried with oil. Eggs are found in stores or stalls that have been packaged and also there are labeled. It is delicious and the price is affordable.

Figure 1 : Nuts Eggs

The raw material of this peanut product is peanut. The ingredients of this egg bean mix consist of eggs and wheat flour and spice pendukugnya. Eggs serve as perenyah, as well as adhesive nuts, for flour serves as a wrapper nut. Beans are wrapped in flour, then ready to do the process of frying. The frying results cause peanuts with high oil content. High levels of oil cause the egg beans quickly smelled musty old greed will rot. High levels of oil, it is necessary to be eliminated. The process of removing the oil content using the process of incision. There are two methods in the slicing process, namely by manual and using the machine. Egg slicing machine with motor power can reduce the level of oil in the egg beans. So with this peanut slicing machine, will get the desired results.

1.2. Working Machine Principles

Here's how the egg peanut dryer machine (1) The egg-peanut product to be dried is put into an oil drum dryer tube. The rotary tube is rotated by the axle connected to the electric motor using Vbelt (2) There is an interesting pull force between the motor and the pulley through Vbelt which moves the rotary tube through the shaft (3) The mass of the egg nut (m) rotated by the rotational velocity (v) tube (r) will produce centrifugal force (F) (4) As a result of the centrifugal force occurring at the time of rotating rotary tube, the drained peanut products or products will move towards the side of the oil dryer's drying machine tube. The material or product that is smaller in size than the size of the rotary tube hole such as oil or water, will move

out through the rotary tube and fall on the tube of the oil dryer (5) Further oil flows out into the container because the slope of the tube base remains the dryer oil. So that the egg bean product left in the basket becomes dry (6) After that the egg nuts can be removed from the tube through a rotary tube that can be lifted using the handle so that the egg beans can be ejected easily.

2.   CONCEPT OF DESIGNS
2.1. Time and place
Making this Final Project is done in Midun Engineering workshop, Payakumbuh conducted in March to May 2014.

2.2. Planning Tube Play
The rotary tube serves to place the egg bean weighing 8 kg. componen the most important and the main of this machine is serves to hold food and remove oil from between the hole. Made of stainless foot grade plate that is 8mm thick and has many holes 3mm in diameter. The selection of stainless plate aims to make processed food safe for consumption. This component rotates while working.
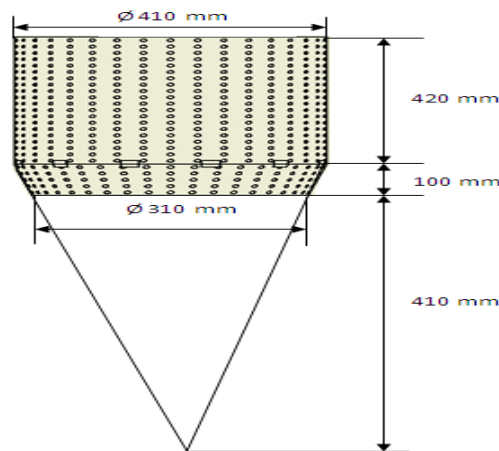

Figure 2 : Planning the tubes to drain the oil

Image of the Egg Shell Tube. Then calculate the volume of the rotary tube ie:

$$V = V \text{ top tube} + V \text{ bottom cone}$$
$$= \pi \, r_1{}^2 \, t + ((\tfrac{1}{3}\pi \, r_1{}^2(t_1 + t_2)) - (\tfrac{1}{3}\pi \, r_2{}^2 t_2))$$
$$= 3{,}14.170^2.340 + ((\tfrac{1}{3}.3{,}14.170^2.410) - (\tfrac{1}{3}.3{,}14.155^2.\,310))$$
$$= 45661586{,}66 mm^3$$
$$= 45{,}66158666 dm^3$$
$$= 45{,}7 \text{ Liter} = 8 \text{ kg}$$

2.3. Electric Motor Power
The torque of round tube of Egg Diesel Engine with 10kg load and tube diameter 340 mm, ie:
$$T = F \text{ x } r$$
$$= 10kg \text{ x } 170mm$$
$$= 1700 \text{ Kgmm}$$

Electric motor power that is used to rotate the shaft is to find the torque of the electric motor from the power of 0.5 HP at 1400rpm rotation is:

P_{motor} $= 2.\pi.n.T_{motor}$

0,5 HP $= 2 \text{ x } 3{,}14 \text{ x } \frac{1400 \, rpm}{60 \, second} \text{ x } T_{motor}$

Then: T_{motor} $= \frac{372 \, watt}{146{,}53 \, put/detik} = 2{,}54 \text{ Kgm}$

So the torque that occurs in the Egg Peanut Engine is smaller than the torque of the electric motor, which is 1700kgmm <2540 kgmm then the 0.5 volt electric motor is capable to rotate the drying tube on the Egg

Dryer Machine. Minimum motor power required to rotate the oven nut shipping tube 420 Rpm (data from the test tool) ie

Pmin= $2.\pi.n.Tm$otor

$= 2x\ 3,14x\frac{420\ putaran}{60\ detik}$ x 2,54 Kgm

$= 2$ x 3,14 x 7 rotation / sec x 2,54 Kgm
$= 111,66$ watt
$= 0,149$ Hp

From the above calculation then the tube can rotate at least has a power of 0.149 Hp, but in the use of electric motors for peanut oil dryers machine is using 0.5 hp power, because it utilizes an existing electric motor.

2.4. Axis Design
The vertical axis gets the load from the rotary tube and the engine rotation. Turn this shaft 500 rpm to rotate 8 Kg of egg beans.
a. Torsion moment due to motor rotation
   P = 0,5 Hp
   n = 500 rpm
   Formula:

M= $9,74\times10^5\frac{P}{n}$ (Sularso and Kiyokatsu Suga, 2004:7)

$= 9,74$ x $10^5\frac{0,5}{500}$
$= 974$ kg.cm

b. Allowed shear stress (σ_a)
Formula:

$\sigma_a=\frac{\sigma B}{Sf1\ x\ Sf2}$ (Sularso and Kiyokatsu Suga, 2004:8)

$\sigma_a=\frac{37}{6\ x\ 3} = 2,05$ kg/mm^2

c. Shaft Diameter

Is known:
Km = 2   M = 974 kg.mm
Kt= 2 T = 88 kg.mm
Formula:

$d_s \geq \left[\frac{5,1}{\tau a}\sqrt{(Km.M)^2 + (Kt.T)^2}\right]^{1}/_{3}$

(Sularso and Kiyokatsu Suga, 2004:18)

$ds\geq[\frac{5,1}{2,05}\sqrt{(2x974)^2 + (2x88)^2}]^{1}/_{3}$

$ds\geq 16,96$ mm
Information:
Km   = Flexible correction factor
Kt   = Torsion correction factor
d_s = Shaft diameter (mm)
M   = Bending moment (kg.mm^2)
T   = Torque moment (kg.mm)
τ_a = Allowed shear stress (kg/mm^2)

3.   RESULTS
     Testing is done at two different times which aims to find out how big the success rate of this machine (in accordance with the planning that has been made), whether efficient and effective and the framework used strong and sturdy. Here is the time and place of testing:

(a)   Time and place of testing 1
          Location   :   Bengkel Midun Teknik, Payakumbuh
          Date   :   4 Mey 2014
(b)   Time and place of testing 2
          Tempat   :   Bengkel Midun Teknik, Payakumbuh
          Tanggal   :   18 Mey 2014

Table 2 : Test result

Time (Minutes)	Weight (Kg)
0	2,1
3	2,05
6	2

After the process of designing and manufacturing process of peanut oil dryer machine, then the next step is to perform performance test. Test results of the machine will be discussed in order to note the weaknesses and errors that occur during the process of making the machine so that the manufacture of similar machines will be better for the future.

Testing is also done on each component that is on the machine that aims to determine whether all components can work well as expected. So that can be done improvements and innovations on the machine for the next manufacture.

4.   DISCUSSION

After the performance test of this egg nut machine can be concluded that the machine can work optimally in accordance with expectations. The oil content in egg beans can be reduced to the maximum, but there are still various shortcomings in this machine. Testing the performance of Oil Peniris Machine on Egg Nuts is to buy egg beans that have been dried in the market weighing 2 kg then fried again so that there is oil and weighs to 2.1 kg. So drain is considered successful if the peanuts are still oil-weight 2.1 kg after drained will be reduced weight to the original weight of 2 kg then declared succeeded in draining the oil well. Although there are some beans that are missing during peanut removal from the machine drain. The results obtained after the testing process: (1) Minimize the remaining cooking oil contained in freshly fried foods. In other processing after frying process using cooking oil medium must be a lot of rest of cooking oil contained in nuts. This causes various losses or unwanted effects by producers or consumers who consume the results. To overcome this it is necessary a tool that can to eliminate or meminilasikan oil / oil residual content in food (eggs) (2) Lowering cholesterol contained in food (3) Increase production (4) Eliminate the occurrence of food rancidity (5)) Reduces germplasm in foods.

5.   CONCLUSION

The design and manufacture process up to the test can be summarized as follows: (1) Egg drying machine in egg bean is able to dry egg bean with capacity of 8 kg (2) Design of egg bean dryer machine have specification that is machine height 380 mm, machine length 600 mm, width of machine 300 mm, and weight + 100 kg (3) The design of the electric motor obtained the minimum required motor power results in the design of this egg peanut machine is 0.149 HP. However, due to losses / power losses and electric motors available in the market then the electric motor power used in the design of this egg nut machine slicer is 0.5 HP (4) The result of shaft planning, the diameter of the shaft used is 22 mm because it adapts to the tube pipe outer diameter 1 inch (5) The belt used in egg slicer machine is A type belt, L = 963.7 mm, No 36, 1 piece, and 3-inch diameter selectable components with 14 mm shaft hole and 6 inch inner diameter with 14 mm shaft hole, axis spacing 298 mm (6) Peanut output system with removal of rotary tube, this facilitates in the process of removal of dried beans. The design of peanut slicing machine is still far from perfect, both in terms of material quality, appearance, and work system / function. Therefore, to be able to improve the design of this machine needs a further thought with all its considerations. Some suggestions for steps that can build and refine this machine are as follows: (1) Need for slope additions to the nut channel (2) Machine maintenance starts from the lubrication periodically on the bearing and pivot components (3) Cleaning the rotary tube after slicing and inspection periodical and daily

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