A Study of Coconut Oil Pressing Machine

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Abstract

The technology development has been continuing to solve the cost problem, aiming to reduce work time, to streamline the existing machines to be more efficient and productive, including designing the devices to replace human labor. In present paper, the author has an idea to develop and transform the old press machine which has faced the issues of the deteriorated helix core, bunt motor when overloaded, less productivity to hydraulic cylinder.

This paper examined the development of the coconut oil pressing machine from old model to hydraulic cylinder system. In operating principles, the developed machine uses the motor pumping the hydraulic oil into hydraulic pump, the oil fuel was restricted by hydraulic pump to increase the pressure transmitted to the solenoid valve which is responsible for changing the direction of the oil flow, resulting that the cylinder moves up and down under the control system. The cylinder presses the coconut pulp

The study of the development of coconut oil press machine was initiated by drying the 3 kg coconut pulp in the sun to obtain the 0.2038 kg (or 160 ml) coconut oil. In this study, the hydraulic cylinder presses 3 kg dried coconut pulp into 1.1858 kg (or 946 ml) coconut oil, or accounted for 83.08% as compared the old machine. The payback period is within 29 days.

Key words: Coconut Oil Pressing Machine

1. Introduction

Coconut is one of the economically important plants in Thailand. Thai people make advantages of the coconut for everyday consumption in main menu and desserts. Later, the coconuts have been extracted to become coconut oil because coconut oil is costly while the coconut is cheap. There are various advantages in coconut oil, so people attempt to find out how to add the value to coconut. With extracting method, it found that the extracted coconut oil is useful in different ways by many means; for examples, to produce the hair styling gel, drug, facial cream, shampoo, and so on. The cooling extracted coconut oil is 250-400 Baht /liter, 3 times increases of the value. The result found that the coconut oil press machines have been fabricated by helix core system. However, because of the heat generated from pressing process, the electricity of motor is cut off or shorter time of service. Meanwhile, with the helix core with much pressure causes the breakage of the covering grate and steel cover due to its poor performance of pressure. The coconut oil derived contains of the coconut residues, the less amount of coconut oil unworthy buying the coconut pulp.

Therefore, this purpose of the study was aimed to develop the innovative press machine for coconut oil by which hydraulic cylinder is used in press process to increase the production of the coconut oil.

2. Related Theory

In fabricating the coconut oil press machine, it's necessary to investigate the related theory and the feasibility of the project. The information search was conducted to design the machine. The knowledge of engineering and technology was applied. This sector described the related theory as follow

- Coconut and Coconut Oil Theory
- Structural Theory of Machine
- Pressure Theory
- Motor Theory
- Break-Even Theory

3. Methodology

This section described the methodology for coconut oil press machine on different parts of the device. Data and design-related theory were employed, calculated, and applied to fabricate the coconut oil press machine. The processes are crucial to the operation.

Work Procedures
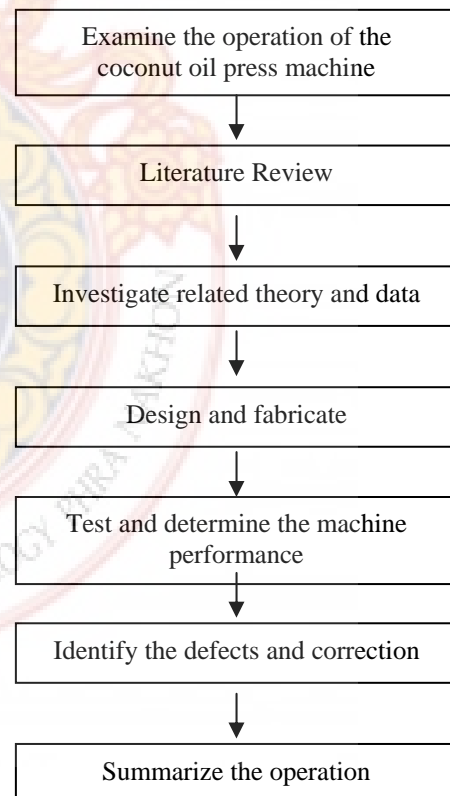
Exhibition 1 Work Procedures

The experiment of the use of hydraulic-based the coconut oil press machine developed and fabricated by the researcher was intended to see if its operation meets the objective or not, and to understand the issues to identify what area is a problem, and how to solve it. The conclusion and suggestion will be discussed in later section.

TABLE 1 Trial of coconut pulp extracted for dried coconut milk for 200g each

NO	Coconut Pulp (g)	Pressed Coconut Pulp (g)	Lost Coconut Pulp (g)	Coconut Oil (g)	Coconut Oil (ml)	Time (Min)	% Lost Coconut (%)
1	200	185	15	14.7	5	1.24	7.5
2	200	180	20	19.6	7	1.46	10.0
3	200	190	10	9.8	4	1.31	5.0
7	200	182	18	17.64	7	1.56	9.0
8	200	184	16	15.68	8	1.42	8.0
9	200	186	14	13.72	6	1.49	7.0
10	200	182	18	17.64	7	1.54	9.0
เฉลี่ย	200	184.3	15.7	15.386	6.2	1.409	7.85

NOTE: The lost weight of coconut oil accounted for 2% when compared as gram.

TABLE 2 Trial of 3kg filled into the operation until the coconut was used up, the non-extracted coconut pulp was used.

Coconut Pulp (g)	Pressed Coconut Pulp (g)	Lost Coconut Pulp (g)	Coconut Oil (g)	Coconut Oil (ml)	Time (Min)	% Lost Coconut (%)
3,000	1,790	1,210	1,185.8	946	23.39	40,33

TABLE 3 Trial of 2kg filled into the operation until the coconut was used up, the dried extracted coconut pulp was used.

Coconut Pulp (g)	Pressed Coconut Pulp (g)	Lost Coconut Pulp (g)	Coconut Oil (g)	Coconut Oil (ml)	Time (Min)	% Lost Coconut (%)
2,000	1,834	166	162.68	59	17.16	8.3

TABLE 4 Trial of the pressed coconut pulp to repeated press with 3kg filled into the operation continuously until the coconut pulp was used up

Coconut Pulp (g)	Pressed Coconut Pulp (g)	Lost Coconut Pulp (g)	Coconut Oil (g)	Coconut Oil (ml)	Time (Min)	% Lost Coconut (%)
3,000	2,735	265	259.7	250	27.37	8.83

TABLE 5 Results of the coconut oil pressed with the old machine, 3kg filled into the operation continuously until the coconut pulp was used up. The non-extracted dried coconut pulp was used.

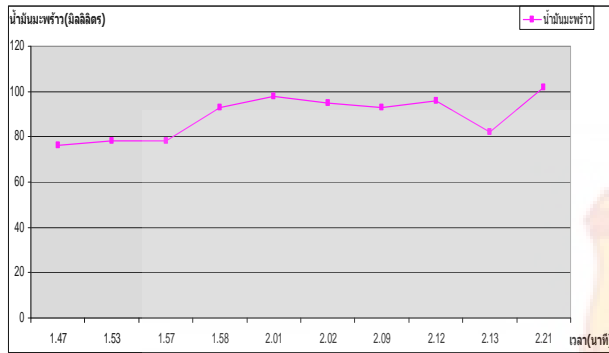| Coconut Pulp (g)	Pressed Coconut Pulp (g)	Lost Coconut Pulp (g)	Coconut Oil (g)	Coconut Oil (ml)	Time (Min)	% Lost Coconut (%)
3,000	2712	208	203.84	160	37.53	9.60

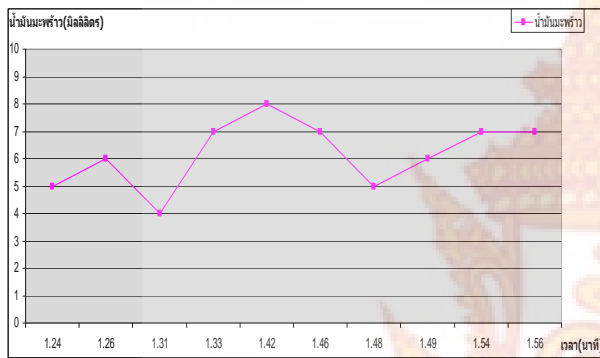**Exhibit 4-14 Volume of coconut oil when compared to press time of the old machine**

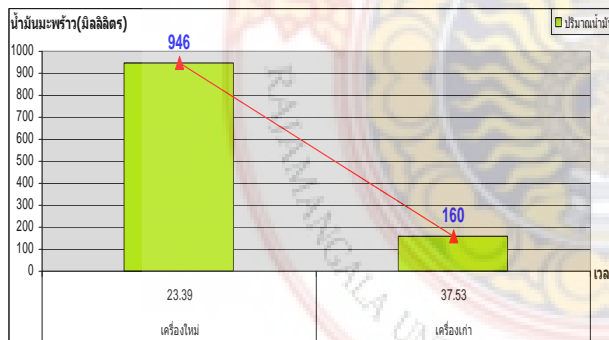**Exhibit 4-15 Volume of coconut oil when compared to press time of the new machine**

Exhibit 4-16 Comparison of volume of coconut oil between old and new machine

Coconut Oil Pressing Machine

Break-Even point

The price for coconut oil is 200Baht/Kg (Sources: www/tumedine.com on May 25, 2010). At a time of coconut oil press, 3 kg dried coconut pulp produces 900 ml. coconut oil daily, and 192 press times produces a total of 17,280ml. coconut oil daily/person/machine. Minimum wage averages 240 Baht/day. Depreciation is 7% yearly.

If unit price 35,500 Baht, depreciation price will 35,000 x 0.07 = 2,450= 35,000 - 2,450 = 32,550 Baht/year

Depreciation cost/day $\frac{32,550}{365}$ = 89.2 Baht/day

Total cost for one work day

Cost = Raw material + electricity + wage + maintenance 7% + others

Cost = 1,900.8 + 27.072 + 204 + 89.2 + 100 = 2,321.072 Baht/day

Coconut oil price for one day press is 17.28 liter x 200 Baht = 3,546 Baht/day

Deductcost 3,546 - 2,321.072 = 1,224.928 Baht

It earns amount of 1,224.928 Baht for one workday.

Device price is 35,000 Baht

To determine the break-even point, the equation is below

$$\frac{35000}{1,224.928} = 29 \text{ days}$$ It takes 29 days workdays for break-even point.

4. Conclusion and Discussion

The result showed that the coconuts to put into the press process should be non-extracted coconuts for they produce more coconut oil than extracted coconuts. The performance of developed new machine is higher than the old machine. The results indicated that 3kg dried coconut pulps produce 160 ml coconut oil. The developed machine which was changed from helix core to hydraulic cylinder system produces greater volume of coconut oil than the old machines. Namely; 3kg dried coconut pulps produce 946 ml coconut oil, indicating that hydraulic cylinder performance is 5.9 times more productive than the helix core-based machine, or the productivity increased by 8.308%, resulting that the break-even is 29 days.

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