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## MACHINE PROCESSING, COOLING, AND MILK PACKAGING COW WITH 3-IN-1 INTEGRATED PROCESS SYSTEM

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### ABSTRACT

The purpose of this study is to provide solutions to problems that exist in SMEs Cow Milk Momoo, especially the problem of production process that the process is still using the traditional way and the tool is still relatively simple. The method used is to utilize Temperature Controller, Motor Wiper, and Heat Exchanger technology which is soaked in water in Processing machine, cooling, and packing of Cow Milk. The expected result is the increasing of productivity and efficiency of production process so that productivity of SME Cow Milk can be increased 2 times fold which initially yields an average of 100 liters of Cow Milk / day can produce up to 200 liters of Cow Milk / day

*Keywords: Cow Milk, Dairy Cow Machine, SMEs Cow Milk, MP3 Supi*

### I. Introduction

Milk is a food stuffs for humans because it contains high nutrients, like carbohydrates, proteins, fats, vitamins and minerals. Milk is a liquid that is the result of milking from cows or other lactating animals that can be used as a healthy food (Soleh, 2004).

Currently milk has many functions and benefits. For a productive age, milk helps their growth. Meanwhile, for the elderly age, milk helps support the bone so as not to porous. Milk naturally contains important nutrients, such as various vitamins, proteins, calcium, magnesium, phosphorus, and zinc, another opinion adds that milk contains minerals and fats. Cow's milk has 3.1% fat content, 2.8% protein, 11.2% dry ingredients, nonfat dry ingredients 8,1%. Therefore, everyone is encouraged to drink milk. Now a lot of milk is packed in a unique form. The purpose of this research is for people interested in buying and drinking milk. There is also milk in the form of fermentation (Santoso, 2009).



## II. Background

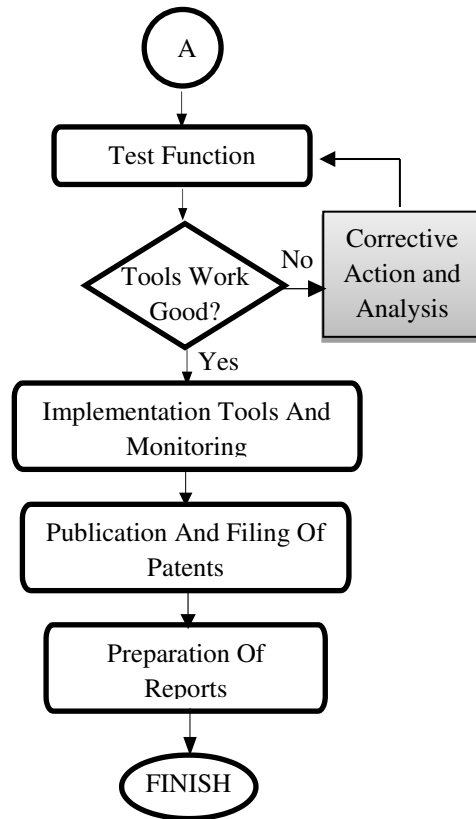


Figure 1. Flowchart Method Of PKM-T Implementation

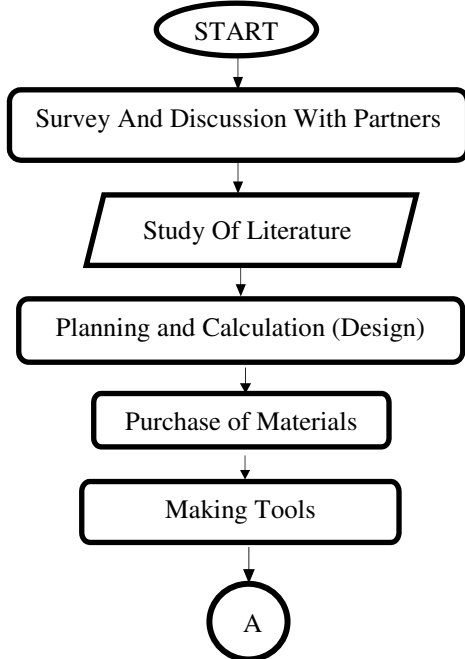
Based on the results of research and observation with Mr. H. Abbas (partner), all this time the process of making cow milk is still using **the traditional way and the manual** also used machine is still **relatively simple**. Problems faced by partner SMEs are **on processing, cooling and packaging**. In the processing (cooking) using a simple stove so that the temperature is not controlled, The temperature used should be precise (65-70°C) because if the temperature is > 70°C then bacteria and germs in cow's milk aren't die also too easily stale and if the temperature <65°C then the nutritional milk of cow is reduced because the temperature is too high. In the process of stirring is done conventionally that is using a manual stirrer so it can be easily tired and hands feel hot due to exposure to steam heat. The next problem is the cooling process takes a long time (30 minutes) and less hygienic because it is left in the open air. While for the packaging process requires several people so that the time required to pack also relatively longer (60 minutes). The objective of PKMT activity is to increase the effectiveness of cow's milk production with indicator: cooking process with controlled temperature, stirring machine with wiper motor drive, cooling process 5 times faster, and packing process 2 times faster.

### III. Method

To achieve the purpose of this activity, the method used in the manufacture (MP3 SUPI) Processing Machine, Cooling, And Cow Milk Packaging on the implementation of Student Creativity Program This technology is displayed on the following flowchart

#### Study Of Literature

Study of literature contains a series of search and assessment activities of relevant and reliable sources in the collection of material and become a reference in writing this PKM. The



literature that we use are Mechanical Elements in Mechanical Design (Robert L. Mott), Mechanisms and Dynamics Machines (Ir Ramses Y. Hutahaean, MT), and Book of Element Machine Volume I (G. Niemann, Anton Budiman, Bambang Priambodo). In this development, the design, the way, and the system in making MP3 SUPI machine.

#### Observation And Discussion With Smes Partners

This activity is the initial stage in finding the data of partner problems, such as the capacity of partner products that only produce 100 liters per day while market demand is 2 times that of SME production capacity, processing of cow's milk still using manual method, and also other related to economic aspect (can not reach maximum target not maximal), social (reducing customer trust to cow milk product) and partner health (during process of making cow's milk).

#### Designing

The next stage is making the design machine "MP3 SUPI". Based on the results of the discussion of the executing team, lecturers and partners then obtained the design "MP3 SUPI" using 2016 inventor software as shown in the picture below:

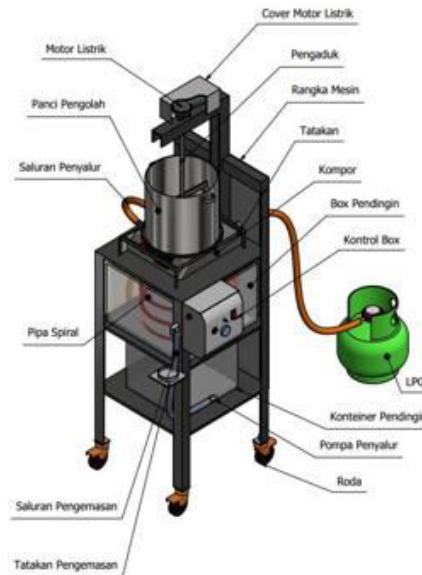


Figure 2. (MP3 SUPI) Processing Machine and Cow Milk Packer with 3 in 1 Integrated System

### Creating Work Order

Sequence of manufacture needs to be made to simplify the process of making the machine, so that the process sequence in the process can be done systematically and orderly.

### Procurement Of Tools And Materials

Before the work begins, it is necessary to purchase materials in and machines used in machining.

### Machine Making

after everything is available, including the tools and support tools that will be used, the next step is the manufacture or assembly of the machine. Usually this process takes a long time but our target is 1 month for machining work. If you encounter obstacles and problems usually use the services of a public workshop or hire a handyman to finish making the machine, but here we try to make the machine itself.

### Test Machine

MP3 SUPI Machine Testing is intended to ensure that the performance of each component of the machine making results can function in accordance with what is expected. The test will be conducted at our partner's premises, at H. Abbas's cow's milk SME in Surabaya.

### Evaluation

The evaluation and improvement phase of the machine is done after the machine testing has been done. At this stage will be assessed the working system of the machine, both from the move, stability mesindan form of perfection of processing results.

If the machine does not meet expectations, failure analysis and corrective action will be performed.

### Implementation Of Machines And Monitoring

After the machine has been tested and get good results and maximum, then the machine submitted to the partner, and testimony in order to get a partner opinion how the performance in the machine. monitoring function is to monitor machine condition used by SMEs partner, then documented and taken also analyzed data.

### Publication And Filing Of Patents

The results of our program that has been completed will be published both scientifically and mass media with the aim that people know the benefits generated by the machines we make. Given the many benefits generated by PKM that we created and in the search results GOOGLE PATENT no one has filed a patent regarding our machine.

### Report Creation

Reporting is done after all stages are completed so that the results obtained from making the machine can be explained in detail according to the data obtained.

### IV. Result

Through the manufacturing and assembly process, it is obtained processing machine and semi automatic milk packer integrated system 3 in 1 as in the following picture.

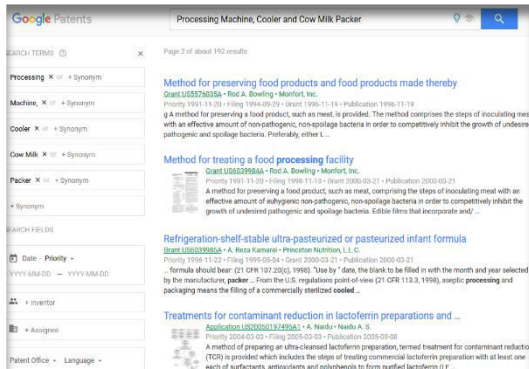


Figure 3. (MP3 SUPI) Processing Machine and Cow Milk Packer with 3 in 1 Integrated System

Table 1. Machine specifications

No.	Description	Explanation
1	Dimension	(50 x 50 x 150) cm
2	Capacity	20 Liter/procces
3	Mixer	Electric motor
4	Heat source	LPG

After the machine is finished in manufacturing, the next stage of activity is to test the engine to determine the machine performance.

Table 3. The Data Of The Machine Test Results When The Valve Is 45 Degrees

Degree of Valves	45°C		
Testing Ke-	1	2	3
Number of Milk In Pans (Liter)	20	20	20
Milk Temperature In The Pans	85°C	85°C	85°C
Water Temperature On Cooler Box	29°C	30°C	32°C
Output Temperature	45°C	49°C	52°C
Debit	2.7	2.7	2.7

Cooking Time (Minute)	20	20	20
Cooling Time (Minute)	4	4	4
Packing Time (Minute)	3	3	3
Total Time (Minute)	27	27	27



Table 3. The Data Of The Machine Test Results When The Valve Is 90 Degrees

Degree of Valves	90°C		
Testing Ke-	1	2	3
Number of Milk In Pans (Liter)	20	20	20
Milk Temperature In The Pans	85°C	85°C	85°C
Water Temperature On Cooler Box	33°C	35°C	38°C
Output Temperature	55°C	58°C	60°C
Debit	6	6	6
Cooking Time (Minute)	20	20	20
Cooling Time (Minute)	4	4	4
Packing Time (Minute)	3	3	3
Total Time (Minute)	27	27	27

Referring to the results in Table 2 and Table 3, it can be said that the machine can work properly. It can be seen from the performance of the machine that shows all the components work well especially in the system of stirring, cooling, packaging and temperature that can be controlled and feels in accordance with the needs during the process of milk production in partner SMEs.

Based on the test results of the machine, the machine is said to be eligible to be sent to partner SMEs. The next stage of the machine is applied in partner SMEs with the results shown in Table 3.

Tabel 3. Comparison data of machine implementation results in partner SMEs

No	Description	Before PKM-T	After PKM-T
1.	Production capacity	100 Liter	100 Liter
2.	Cooking Process	30 Minutes	20 Minutes
3.	Cooling Process	20 Minutes	4 Minutes
4.	Stirring Process	Manual so quickly tired	Mixer driven by electric motor
			
5.	Gas Consumption	450 gr	200 gr
6.	Packaging Process	30 Minutes	3 Minutes
7.	Total Production Capacity	100 Liter/Day	200 Liter/Day

## Discussion

Based on the results of this machine research and monitoring in partner SMEs, the results obtained that the use of Controller Temperature and Wiper Motor can help the process of processing and mixing becomes more practical because the engine is driven by electric motors, the use of Heat Exchangers can accelerate the original cooling process 20 minutes to 4 minutes, and speed up the packing process from 30 minutes to 3 minutes, the product is also more hygienic because the processing tube and stirrer are made of stainless steel. In addition, the partner SMEs are pleased with the existence of this PKM activity, and hope that with this

activity, processing and packaging of cow's milk to be 2 times more effective and efficient so as to increase the productivity of his business menjadi 2-fold.

## V. Conclusion

Application of "MP3 SUPI" Processing Machine and Cow Milk Packer Integrated 3 in 1 system is very useful for SMEs Cow milk so that the production process becomes 2 times more effective and efficient which initially 80 minutes to 27 minutes per 20 liters. As for the production capacity increased which initially only 100 liters / day now to 200 liters / day. For the process of agitation to be more practical because the machine is done with electric motor drive, the cooling process becomes 5 times faster, and the packing process which was originally 10 faster and the resulting product is also more hygienic because the processing tube and stirrer made of stainless steel.

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