HYDRA (MULTIPURPOSE HYBRID DRYER) SYSTEM FOR HYBRID DRYER ENERGY EFFICIENCY

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ABSTRACT

The purpose of this research is to provide solutions to the problems of SMES in Kampong Nambangan Kenjeran West about the process of drying fish that are conventional and long drying time. The method was designed to resemble a house that has 3 shelves made from Food Grade and a house wall made from acrylic transfaran, with a hybrid energy system that is sunlight and Infra red stove made from LPG Gas Fuel. This machine integrates ECU (Electrical Control Unit) technology. The results with a hybrid drying system can improve the drying process faster up to 3 times, The productivity increased from 25kg/day to 50 kg/day.

Keyword: Dried Fish, SME, Hybrid, ECU (Elektrical Control Unit)

I. INTRODUCTION

Kenjeran beach is well-known in Surabaya. In this place there are a great many preparations of seafood like scallops and accessories made from the bones of fish, fish chips, shrimp chips, chips, squid and the most successful is the dried fish along the way because there is an awful lot of sellers of dried fish. (observation teams CREATIVITY PROGRAM OF STUDENTS, 2017)

Kampung Nambangan village is situated near the beach of Kenjeran, this village is famous for the processed salted fish, one of which belonged to the mother Mariati located at Kampung Nambangan Lor, Kenjeran partners on this CREATIVITY PROGRAM OF STUDENTS program. Mother Mariati daily producing salted fish less than 25 kg. Sometimes he is producing stockfish over 100 kg in rainy season due to fish more easily caught. The price of dried salted fish sold by Mariati's mother around Rp. 25.000,-until Rp. 30.000,-/kg, the partners we have the revenue of Rp. 110,000,-per day. Mother Mariati running her business is already quite a long time more or less for 6 years. (Observation teams CREATIVITY PROGRAM OF STUDENTS, 2017)

II. BACKGROUND

Based on the results of observation with Mrs.Mariati (SME Partner party), during this process of drying salted fish are still using the traditional way i.e. the fish is cut in half and cleaned from litter, then placed on a bamboo placemat then stretched and dried rely on solar heat and dried on the outside environment. The problems encountered by the partners that is quite a long drying

process i.e. ± 2, uneven drying, as well as the capacity of the shelf slightly i.e. only able to accommodate 3-4kg fish in 1 tray, while still requiring 5-6 tray even when the weather was overcast with the drying process can reach ± 8 hours, the process of drying the fish with an open system has a vulnerable to the risk of contaminated dirt and bacteria-bacteria so that products tend to be unhygienic. (Budijono, 2016). The purpose of CREATIVITY PROGRAM OF STUDENTS designed machine Hydra (a Hybrid Dryer Multipurpose) Fish Dryers energy-efficient Hybrid System equipped ECU. Hydra is a Hybrid system with a dryer that utilizes two sources of energy in the process of drying food i.e. Hot sunlight, heat and infrared burner gas fuel (LPG) so that it can increase the drying process is faster to 3 times, maintain hygienic products awake and efficient in fuel use up to 20% so that productivity rises 2.

III. METHODOLOGY

To achieve the goal of this activity, then the methods used in manufacturing (HYDRA) Fish Dryers energy-efficient Hybrid System equipped ECU on the implementation of this Technology Student Creativity Program shown on the flowchart below.

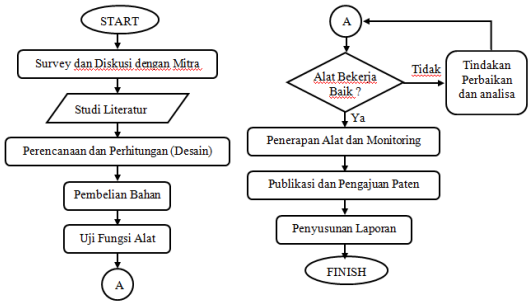

Figure 1. Flowchart Of Research Methods

Study Of Literature

Study of literature activity contains a series of Literature and the study of relevant sources and trusted in the collection of the material and become a reference in the writing of the CREATIVITY PROGRAM OF STUDENTS. The literature which we use in the form of the book elements of Mechanical Design in Machine (Robert l. Mott), mechanism and Machine Dynamics (IR. Hutahaean Ramesses Y., MT), and Machine Elements book Vol I (g. Niemann, Anton Bambang Priambodo, dear reader). In this stage the design reference is obtained, the workings of the security system, and in the manufacture of Machine HYDRA.

Observation and Discussion

This activity is an early stage in the search for partners, such as the problem of data capacity product partners who only produce salted fish less than 25 kg each day, while the market demand of 3 times the production capacity of SMES the dried fish still using manual, as well as other issues related to economic aspects (cannot achieve maximum targets so that income is not a maximum), and health partners (when dried fish).

Design Creation

The next stage, namely the manufacture of engine design "HYDRA". Based on the results of discussion the implementing team, lecturers and tutors partners then obtained the design of "HYDRA" using inventor software 2016 as shown in the picture below:

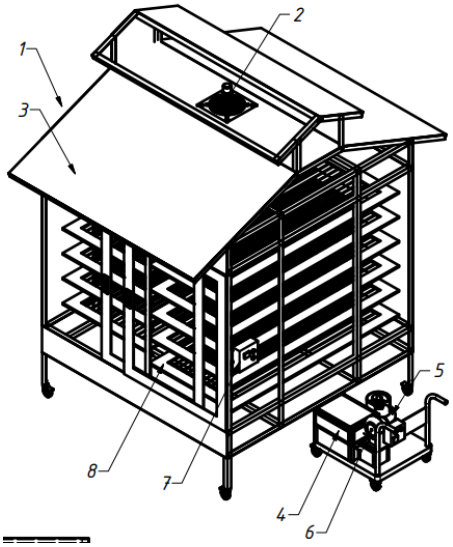

Figure 2. (HYDRA) Fish dryers energy-efficient Hybrid System equipped ECU

Creating Work Order

Sequence of manufacture needs to be created to make it easier in the process of making machine, so the order process

on the work can be done in a systematic and orderly.

Procurement of Machines and Materials

Before the work started, certainly needs to be done in materials purchase and machinery used in the manufacture of the machine.

Manufacture Machine

After everything is possible, including gadgets and machines supporting machines that will be used, then the next step is the making or Assembly machines. Usually this process takes a long time but our target is 1 month for the workmanship of his machines. When encountering obstacles and problems typically uses the services of public workshop or hires to complete the manufacture of machinery, but here we are trying to make the machine do it yourself.

Test Machine

Testing Machine HYDRA is intended to ensure that the performance of each component of the making of the machine can function in accordance with what is expected. Testing will be done at the place of our partners, dried fish in SMEs belonging to Mother Mariati in Surabaya.

Evaluation

Stages of evaluation and refinement of the engine was done after testing the engine done. At this stage be assessed the work of the machine system, both from the move, the stability of the machine and the form of perfection results processing. If the machine is not in accordance with the hope it will be done the analysis of failure and its repair actions.

Implementation and Monitoring

After the machine made was tested and get a good result and the maximum, then the engine is turned over to the partner, and do a testimonial in order to obtain the opinions of partners how the performance in the machine. Monitoring carried out in order to monitor the condition of the engines used by partner, then documented and taken also analyzed data-data.

Publication and Patent

The results of the program that we perform will we publish both scientifically as well as mass media with the goal of keeping the public aware of the benefits generated by the machines we make. Given the multitude of benefits generated by CREATIVITY PROGRAM OF STUDENTS that we create as well as in search results GOOGLE PATENT no one has filed a patent on our machines.

Report Letter

The making of reports done after all stages are resolved so that the results obtained from the manufacture of the machine can be explained in detail in data obtained.

IV. RESULTS and DISCUSSION

Fish dryers combines two natural drying and mechanical way. Natural drying assisted heat rays of the Sun by using transparent acrylic walls, so that the drying process is faster because the heat from the sunlight into the Chamber dryer can increase 5 C to 10 C and fuel gas use heat excharger that serves as a heat exchanger on the process of drying with hot air circulate to the space of the dryer so that the temperature in the dryer can be optimal. This machine comes to ECU set the temperature of the dryer, so that space-efficient fuel use. By using the material of machines made of food grade materials. Expectations from this research is that the machine can increase the productivity and effectiveness of the hygiene and safety in the production process, improved economy businessmen

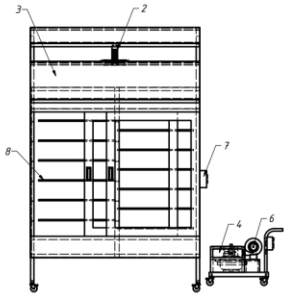

Figure 3. HYDRA

CONCLUSION

These machines also use foodgrade material so the use of this machine to be more hygienic. By using it, so businessmen can increase production capacity, so that it is able to boost the economy employers.

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