"FISH BOX PERLTIER COOLER"
FISH COLLING BOX EQUIPPED WITH PELTIER ELECTRIC COOLER (PEC)

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ABSTRACT

The purpose of this study is to provide solutions to problems that exist in SMEs D.Sadewa Kenjeran Coast region in the process of cooling and storage of marine products is traditionally the process is still using ice as the cooler in the box (box) fish storage. The method used by using PEC in the box of fishes storage to produce stable temperature. The PEC box control system is equipped with Arduino and programmed with CX programmer. It is designed to accommodate 15kg of fish /process. The expected result is to improve the stability of the cooling process (below 100C), So the productivity of SMEs can be increased twice .

Keywords: SMEs, Cooling Fish, box fish. Electric peltier cooler

I. INTRODUCTION

This study was to determine the problems that exist in SME fish collectors and provide appropriate solutions to mengatasinnya. As we know the general problems that exist in SMEs that technological limitations in the form of machinery or tools to support the production of products and meet the needs of the market.

Small and medium enterprises (SMEs) a sector which has an important role in supporting economic development in Indonesia, because most of the population with low education and living in small business activity in both traditional and modern sectors (Pratomo, 2004). In order to encourage rapid economic growth, balanced, equitable and sustainable, the Government draw up the Master Plan for the Acceleration and Expansion of Indonesia's Economic Development (MP3EI) 2011-2025. As one sector of the economy, productivity of SMEs need to be improved based technology content (content technology) SMEs which consists of four components, namely: technoware (physical equipment), humanware (human resources capability), infoware (documents / facts, information systems), orgaware (institutional / leadership). This research was conducted in order to determine how the role of technology in increasing the productivity of SMEs. The results showed that the rate of utilization of technology-based technology content in the production process of SMEs is still low.[1]

Refrigeration fish is one of the curing process that is commonly used to overcome the problem of decaying fish, both during catching, transport, and temporary storage before it is processed into other products. Fish seafood itself manifold and include foodstuffs that are easily broken (perishable food) so long that over time will occur fish quality deterioration caused by spoilage microorganisms (Putro, 2008). Therefore, an attempt to preserve the freshness of the fish or inhibit damage to the fresh fish can be done with preservation. [2]

This scientific article is the result of research and application of technology from the students to provide the right solution for SMEs problem contained fish collectors, ranging from research discussions and interviews with related parties so as to provide the right solution for increasing productivity fresh fish production.

II. BACKGROUND

Pendingina process and storage of fresh fish on umumya done traditionally by using ice cubes just inside the cooler to prevent decay, can be improved and added with the use of technology Peltier effect / thermo electric cooler that can increase the effectiveness and productivity of SMEs. Thermo Electric Cooler (TEC) / Peltier is an electronic component that uses the Peltier effect to create a heat flow (heat flux) on the connection (junction) between two different types of material, meaning that if the process is reversed so the heat and the cold will be swapped on the tips end connections (Peltier, 1834). [3]

Constraints in the can after going through observations and interviews with fishermen and fish collectors pegusaha, ie during the storage process fish are still using traditional and conventional ways as well as the tools used are still relatively modest. The problems faced by SMEs are partners in the process of saving the fish in the cooler. During this process the fish are still using the storage box (box) and ice cubes just as a coolant, so that the resulting temperature can not be stable and need to be checked and the transfer of the fish gradually and regularly. Another consequence of the use of inadequate production equipment can cause rapid fish rot because over time the temperature will continue to rise (above 100C) which can be indicated with the melting ice cube,

Therefore, an alternative is needed in the form of technological tools that can help improve the productivity and effectiveness of the entrepreneur. The right solution is to adannya / FIBEER that the creation of "Fish Box Peltier Cooler" to improve the stability of the cooling process (below 100C), the bacterial growth will be slower that the results could last longer sea and hygiene, as well as increase productivity in SMEs.

Interest in this research activity is memberikasn solutions by creating a machine that can improve the effectiveness and production of fresh fish with indicators: the process of saving the fish using the method of utilization of the Peltier effect / Thermo-electric cooler (TEC) and Electric Temperature Cobntrol (ETC), with equipped ACCU (battery / battery) and fans (fun), so that fresh fish storage process will last a long lenih, as well as the cooler is in desaign to accommodate more fresh fish, in order to improve manufacturing productivity becomes twice than ever.

III. RESEARCH METHODS

The method used is the development of research methods or research and development (R & D). Methods of research and development is the research methods used to produce a specific product and test the effectiveness of these products (Sugiyono, 2013) [4]

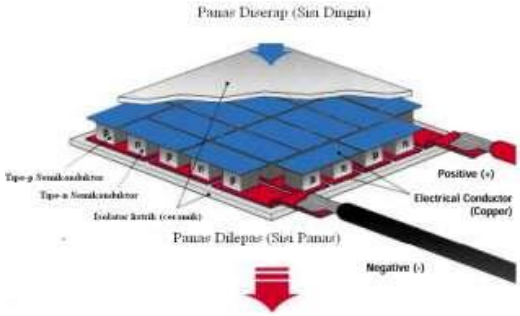
Based on emerging issues we strive to create innovative works whose output is useful for society, with a strong theoretical knowledge based we implement a tool **"Fish Box Peltier Cooler" Cooler Box Fish By Utilizing Peltier / Thermo-Electric Cooler** which the application of this tool is based on the theory of previous research experts.

Based on the opinion of Peltier (1834) bahwasannya Thermo electric and cooler (TEC) / Peltier is an electronic component

that uses the Peltier effect to create a heat flow (heat flux) on the connection (junction) between two different types of material. This means that if the process is reversed, the heat and the cold will be swapped at opposite ends of the connection.

While the research results Seebeck (1825) explains that an electrical circuit is closed, which consists of two metal wires of different types of material, there will be two connections A and B, and if we give the temperature difference constant at both ends will flow electric current unidirectional on both the metal wire and when it was decided one of the wires and was given a galvanometer, it will be seen the voltage difference of the two ends.

In thermoelectrically system has two grooves that groove absorption and heat dissipation at the cold junction. The heat in the system is absorbed by electrons passed from the lower energy level in semiconductor typ.ep to a higher energy level, namely the n-type semiconductor. At the hot junction, energy is released into the environment by means of electron flow from a higher energy level (type-n) to the lowest energy level (p-type). (Taylor, RA., Solbrekken, G., 2000)



This study was conducted during 5 months of the year 2017/2018 basecamp location of public universities and SMEs Surabaya fish collectors effort "D. Sadewa "Kenjeran Surabaya

Tools and materials used are notebook binders, peratan board, laptop recording device, the cameras and reference books and guides peneltiian

The data collection method used is taking a sampling of the production process and analyzed as well as take part directly in the process of storage, or cooling the fish and analyze observation supported by the use of the methods toeritis Research and Development (R & D).

In addition to using (R & D) This study also through direct observation on the field. By considering the problems existed and provide the right solution with proper technology. Here is a flowchart of a series of research activities,

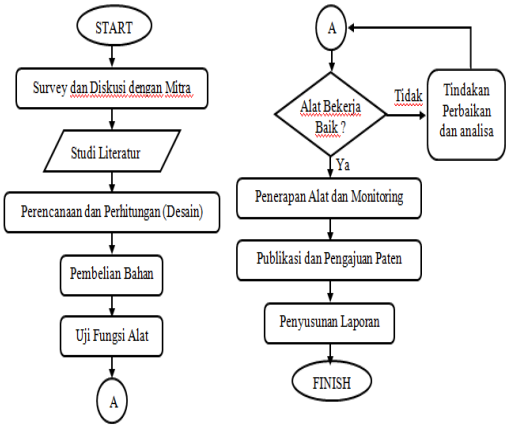


Figure 1. Flowchart Methods

Observations and Discussion with Partner

This activity is the early stages of searching for data-data that is required, Observation and FGD (Focus Group Discussion) conducted by the team with the employers, where the discussion is to discuss the conditions of employment of the employer and the constraints faced and the impact of short-term and long-term obtained by employers both from the aspect of technology and economics. As production capacity in one-time process, how to market demand, as well as the cooling process constraints fish) as well as social aspects (lack of customer confidence towards cooling fish products) will be health and keheginisan product during the process of cooling.

Study of literature

Literature contains a series of activities and reviewing the Search for sources of relevant and reliable in gathering the material and made reference to the writing of this CREATIVITY PROGRAM OF

STUDENTS. The literature that we use, among others in the form of a book Elements of Engineering I (Robert L. Mott), Element II engine (Robert L. Mott), Design of Machine Elements, as well as journals and articles about fish explanation cooling device, and the results of research or technology tool previously associated. In this phase obtained reference designs, work methods and safety system in the manufacture of Machine Fish Box Peltier Cooler.

manufacture Design

The next stage is planning and making of design "Fish Box Peltier Cooler". Based on the results of the implementation team discussion, lecturers and partners, the obtained engine design "Fish Box Peltier Cooler" proper, where the design has been the team discussed with entrepreneurs. The design of this machine design using Autodesk Inventor 2015 software Student Version as shown in the figure below:

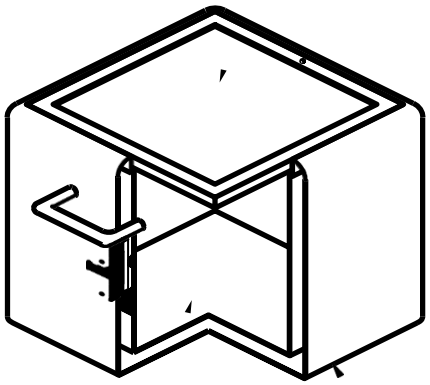


Figure 2. Design Fish Box Peltier Cooler

Once the design is created the next stage of analysis Design From the initial design has been created, analyzed together to determine the range of possibilities in the process, whether it can be used, what in accordance with the wishes of partners, whatever the obstacles, how to handle it, then what alternative use.

Providing Tools and Materials

Before work begins, of course, necessary to purchase the materials and machines used in machining.

Machinery

Once everything is available, including tooling and tool support tools that will be used, then the next step is the manufacture or assembly of the machine. Usually this process takes a long time but our target one month to work on the engine. When encountering many obstacles and problems usually use the services of public workshops or hire a handyman to complete the manufacture of the engine, but here we are trying to make the machine do its own.

Testing Machine

Testing Machine Fish Peltier Cooler Box is intended to ensure that the performance of each - each component of the result of making the engine can function according to what is expected. Tests will be performed in place of our partners, in the father's fish collectors SMEs mat in Kenjeran coast, Surabaya

Implementation and Monitoring Machine

Once the machine is made has been tested and get good results and maximum, then the machine handed over to the partners, and do testimonials in order to get the opinion of how your partner in the machine. Monitoring is done to monitor the condition of the engine used by the partners, then documented and taken also analyzed the data - data.

Publication and Patent Filing

The results of the program that we have implemented will be published both scientifically and media with the aim that people know the benefits generated by the machine we made. Given the many benefits generated by CREATIVITY PROGRAM OF STUDENTS we made as well in search results GOOGLE PATENT no one has applied for a patent on our machine.

Evaluation

Phase evaluation and refinement of the engine is done after the test machine is done.

At this stage of the work will be graded system engine, both of motion, stability of the machine and the perfection of form processing. If the machine is not in line with expectations it will do failure analysis and corrective actions.

Making Reports

Preparation of a report carried out after all the stages completed so that the results obtained from the manufacture of machinery can dijelaskaan in detail according to the data obtained.

IV. RESULTS AND DISCUSSION

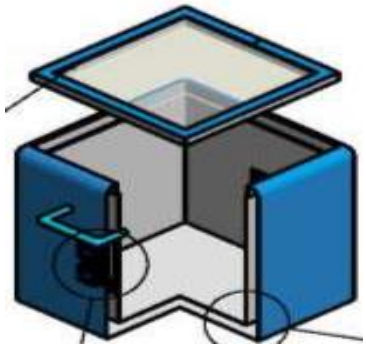


Figure 3. Design of fish cooling machine

Invention is able to reduce temperature coolant temperature by using thermo electric and cooler, which has two surfaces are hot surface and the cold surface, the heat Shink and also the use of a fan that circulates hot temperature with cold temperatures, By using tool material made of Go Green is safe for fish, this machine is equipped with ETC (Electric Temperature Control) which serves to control the temperature by utilizing the effect temperatue pertier / thermo electric and cooler. The proposed invention in principle is controlling the temperature generated by the thermo electric and cooler with the help of electric and temperature sensor as a temperature control medium in the cooler. Equipped with a fan that circulates functioning of Thermo Electrik Cooler temperature into the cooler of fish.

Table 1. Component Specifications

No.	Component	Information	Amount
1	Thermo Electric Cooler	12706	2
2	Fan	12 Volt	4
3	Accu	12 Volt	1
4	Power supply	12 Volt	1
5	Electric Temperature Control (ETC)	12 Volt	1
6	Head Shink (Fin)	Aluminum	4
7	Box	Styrofoam	1

After all the required components are complete, the next stage of activity is the manufacturing process.

Table 2. Specification of Fibeer

No.	Description	Information
1	Dimensions	(75x 45 x 30) cm
2	Capacity	15-30 Kg/proses
3	Cooler	Peltier/Thermo Electric Cooler
4	Power Source	AC (Listrik Rumah) dan DC (Accu/aki)

Discussion

Expected results with the creation of "FIBEER"

This research produces a machine / tool that can improve the effectiveness and produtivitas production of fresh fish with indicator: the process of fish storage using the method of utilization of Peltier / Thermo electric cooler (TEC) and Electric Temperature Control (ETC), equipped with ACCU (battery / battery) and Fan (fun), so that the fresh fish storage process will last longer, the temperature inside the cooler box remains stable, and this cooler box in desaign to accommodate more fresh fish, in order to

increase productivity become twice.

The benefits of this research are:

1. increasing the productivity and effectiveness of the employees
2. minimalist machine designed using lightweight material
3. Improve the economy of entrepreneurs
4. Stable temperature of cooling the fish.

V. CONCLUSION

Application of "FIBEER" - The fish cooler that utilizes the Thermo electric Cooler / Peltier effect is very beneficial for the Fishing Partner SMEs so that the cooling or storage process can stabilize the temperature inside the cooler in the presence of Electric Temperature Control (ETC), and can last a long time and this cooler box in desaign to accommodate more fresh fish, to increase the effectiveness and productivity up to twice.

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