UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING TECHNOLOGY

PRODUCT DESIGN AND DEVELOPMENT OF AUTOMATED HANDHELD FISH SCALES SKIN REMOVER

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BACHELOR OF MANUFACTURING ENGINEERING TECHNOLOGY (PRODUCT DESIGN) WITH HONOURS

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This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Manufacturing Engineering Technology (Product Design) with Honours.

Faculty of Mechanical and Manufacturing Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: Product design and development of automated handheld fish scales skin remover

SESI PENGAJIAN: 2018/2019 Semester 1

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APPROVAL

This report is submitted to the Faculty Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM), as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering Technology (Product Design) with Honours. The member of the supervisory is as follow:

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Supervisor Name   :   Mazran bin Ahmad

Date   :   18 January 2019

DEDICATION

To my beloved mother and father

ABSTRACT

Fish gives a good source of high-quality protein and contains numerous vitamins and minerals. Research in the course of recent decades has demonstrated that the nutrients and minerals in fish, and particularly the omega 3 fatty acids found in several fishes, are heart-friendly and can make changes in brain development and reproduction (Nahak, 2015). Nowadays product design and development is crucial to develop progress on new products and existing products. Automated handheld fish scales skin remover is the product chosen to lead the project. Automated handheld fish scales skin remover is one of the requirements when cleaning the fish and ensuring cleanliness can be maintained properly. The design and development of these fish scales is aimed at reducing the risk of injuries to consumers and wasting pain on wrists. This product will be done using Solidwork software and will continue with the 3D printing process. The field observation has been done at fish market, restaurant and home. The project started by determined the problem statement during removal process. The questionnaire survey was distributed in two phase. The first phase was distributed to 20 random respondent to get the design concept of an automated handheld fish scales skin remover. The second phase, the questionnaire survey distributed for 20 respondent from the household/housewife type, fishmonger or fish seller type, and restaurant types so that, the design was produced based on the respondent needed. In generally, the used of an automated fish scales skin remover is to help the user reduced the time, and to ease when removal of scales process.

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ABSTRAK

     Ikan memberikan sumber protein yang berkualiti tinggi dan mengandungi banyak vitamin dan mineral. Penyelidikan dalam dekad kebelakangan ini menunjukkan bahawa nutrien dan mineral dalam ikan, dan khususnya asid lemak omega 3 yang terdapat dalam beberapa ikan, bebas dari sakit jantung dan boleh membuat perubahan dalam perkembangan otak dan pembesaran (Nahak, 2015). Kini reka bentuk dan pembangunan produk adalah penting untuk membangunkan kemajuan produk baru dan produk sedia ada. Pengawal selia ikan secara automatik menanggalkan kulit adalah produk yang dipilih untuk memimpin projek. Pengawal selia ikan secara automatik menanggalkan kulit adalah salah satu keperluan apabila membersihkan ikan dan memastikan kebersihan dapat dikekalkan dengan baik. Reka bentuk dan perkembangan skala ikan ini bertujuan untuk mengurangkan risiko kecederaan kepada pengguna dan membuang-buang sakit pada pergelangan tangan. Produk ini akan dilakukan menggunakan perisian Solidwork dan akan diteruskan dengan proses percetakan 3D. Pemerhatian lapangan telah dilakukan di pasar ikan, restoran dan rumah. Projek ini bermula dengan menentukan kenyataan masalah semasa proses penyingkiran. Kajian soal selidik telah diedarkan dalam dua fasa. Fasa pertama diedarkan kepada 20 orang responden secara rawak untuk mendapatkan konsep reka pengawal selia ikan secara automatik menanggalkan kulit. Fasa kedua, kajian soal selidik diedarkan kepada 20 responden daripada jenis isi rumah / suri rumah, jenis penjual ikan atau penjual ikan, dan jenis restoran supaya reka bentuk dihasilkan berdasarkan responden yang diperlukan. Pada umumnya, penggunaan alat pengawal selia ikan secara automatik menanggalkan kulit yang digunakan adalah untuk membantu pengguna mengurangkan masa, dan untuk memudahkan apabila penyingkiran proses skala.

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LIST OF ABBREVIATIONS

AM   Additive Manufacturing
CAD   Computer Aided Drafting
CDT   Cumulative Trauma Disorder
FYP   Final Year Project
HOQ   House of Quality
PDD   Product Design and Development
QFD   Quality Function Deployment
3D   Three Dimensional
e.g.   For Example
kg   Kilogram
mm   millimetre

CHAPTER 1

INTRODUCTION

1.1   Introduction

This section was concentrating on how this project is chosen. It begins with project background and proceeded with the problem statement that will look on problem surrounding of the product. Then proceeded with one strongly objective, it is to identify the aim of this product. Next is the scope of the project, which describe the most suitable method for use on this project.

1.2   Project Background

Fish gives a good source of high-quality protein and contains numerous vitamins and minerals. Research in the course of recent decades has demonstrated that the nutrients and minerals in fish, and particularly the omega 3 fatty acids found in several fishes, are heart-friendly and can make changes in brain development and reproduction (Nahak, 2015). This has featured the role for fish in the usefulness of the human body. As indicated by a current statistical data, the estimation demonstrate a global per capita fish supply to about 16.7 kg per year. Due to the ease in the source of fishery considering marine, lake or pond, and rivers, it can be availed cheaply on comparing with other animal foods. In this way, it can be effortlessly comprehended that fish has been one of the foods of preference. Therefore, in the preparation of processing fish as a food requires some precautions as it is being handled by several machine setups.

A fresh, hygienically cleaned, well-scaled fish with minimum distortion get favored for the further tasks in making delicious food or packaging. Henceforth, the project discovers awesome application in the genuine by producing handheld device for scaling operation of fish. As an automated handheld is ease in handling, user friendly, portability and enables the targeted customers for making their work more proficient within a very short span of time. This innovation relates to improvements in fish scaling apparatus and has its object to provide a simple, effective and inexpensive device of this hand tool. This innovation also identifies with new and valuable improvement and basic refinements in fish scaler hand tool. A further inquiry of the development is to appropriately utilized for the intended purpose, without the risk of tearing, cutting, or generally harming the skin of the fish

1.3   Problem Statement

This product will relate to improvements in fish scaling apparatus and has an object to provide a simple, efficient and economical way of the descaling task. There are some problems faced by users when removing fish scales, one of the problem is the users are open from injuries. This product was modified in terms of original designs to avoid recurring injuries. Another problems that be considered is the mess that leaves behind when descaling the fish scales. This is one of the causes of hygiene issues. The previous fish scaling hand tool has their pros and cons, some of the hand tool can avoid the injuries while the hygiene issues cannot be handled and vice versa.

1.4   Project Objectives

The main point of this project is to design and develop of automated handheld fish scales skin remover with the safest way and increase the hygienity. Other than that, to understanding the essential standard of machine having a motor. Besides that, the objectives of this project is to understand the typical classification of machines implied for large scale manufacturing and for household / small scale utilize. Last but not least, is to understanding the execution of DC device with electrically recharging system.

1.5   Work of Scope

In order to achieve the objectives, the scopes represented to:

i.   Applied to household type domestic customer, small scale industries like fish seller, and restaurant type business people and hotel.

ii.   Limitations in size of fish scales.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

Literature reviews are all about carried out the information for whole project in order to completing this project. It will focus on product design and development of fish scales skin remover by using hand tool. A product generally begins as an idea which, if practical, develops into a design, then a complete product. The accompanying seven stages can be recognized in a variety product design and development project where is recognizable proof of necessities, practicality study and idea determination, system-level design, detail design and determination of materials and procedures, testing and refinement, fabricating the product, propelling the product, offering the product, and making arrangements for its retirement (Selection, Design, & Farag, n.d.). The criteria that need to focus on getting a good product are material selection, shape selection, color selection, movement mechanism. The sources that been used to complete this project such as books, journal and article. A few investigations underline the solid relationship between product and plan and business achievement and item configuration has turned into a much more unequivocal purchase contention in focused business conditions like car where autos are regularly comparable with respect to their specialized definition, quality and value (Herbeth, Dessalles, & Desmet, 2017).

2.2   Type of fish

In this subtopic will be discussed about the common marine fish and fresh water fish that available at the wholesale market in Peninsular Malaysia. Populaces in eastern Asia devoured fish with cooked rice every day, or as a component of rice dishes or as side dishes (Ahmad et al., 2016). Fish is an essential wellspring of protein and wage for individuals in south eastern Asia. (Agusa et al., 2007). Nourishment utilization shift impressively from nation to nation and even inside a nation because of varieties in ethnicity, geological territories, age and sex (Norimah et al., 2008). Malaysians, specifically, expended fish at any rate once every day in the measures of one and one-half medium fish every day (Ahmad et al., 2016). According to Ahmad et al., (2016), they have prepared a question and asked to the respondent in Malaysia. The question is about fish consumption in daily. Figure 2.1 shows the household address in Peninsular Malaysia to answer the question.

Figure 2.1: The household in Peninsular Malaysia answer the question. (Ahmad et al., 2016)

For the most part, marine fish can be partitioned into pelagic and demurral fish. (Nurnadia et al., 2011). Pelagic fish are those fish related with the surface or centre profundity of body water (Nurnadia et al., 2011). Marine pelagic fish can be separated further into seaside fish and maritime fish contingent upon the mainland rack they occupy (Nurnadia et al., 2011). Table 2.1 shows the common marine fish that available at the wholesale market in Peninsular Malaysia and Table 2.2 shows the freshwater fish that available at the wholesale market in Peninsular Malaysia.

Table 2.1: The common marine fish that available at the wholesale market in Peninsular

Malaysia (Ahmad et al., 2016).

Local name	English name	Species
Marine fish		
Kembung / pelaling / mabung / temenung	Indian mackerel	*Rastrelliger brachysoma, Rastrellinger faughni, Rastrellinger kanagurta*
Selar kuning / pelata	Scad (yellowtail, yellowstripe, smallmouth)	*Selar crumenopthalmus, Selaroides leptolepis, Seriola dumerili, S. leptolepis, Alepes djedaba, A. melamoptera, A. vari, Atule mate, A. apercna*
Tongkol	Kawakawa / Tuna / Bonito	*Auxis thazard, Gymnosarda unicolor, Sarda orientalis, Thunnus tonggol, Euthynnus affinis, Katsuwonus pelamis, T. obesus, T. albacares*
Sardine / Tamban	Sardines / Pilchards	*Amblygaster sirm, Spratelloides delicatulus, Sardinella fimbriata, S.*

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		gibbosa, Dussumiera acuta, S. albella, S. brachysoma, S. jussieui, S. lemuru, S. melanura, Spratelloides gracilis, S. delicatulus
Cencaru	Torpedo scad	*Megalaspis cordyla*
Selayang	Scad (Indian, shortfin and mackerel)	*Decapterus akaadsi, D. macrosoma, D. maruadsi, D. russelli, D.tabl, D. macarellus, D. kurroides, D. lajang*
Bawal (hitam and putih)	Pomfret (black and silver)	*Parasatromateus niger, Pampus argenteus, P. chinensis*
Merah	Red Snapper	*Lutjanus lemniscatus, L. malabaricus, L. sanguineus, L. sebae, L. argaentimaculatus, L. bohar, L. erythropterus, L. bengalensis, l. boutton, l. decussate, L. dodecacantboides*
Tenggir	King Mackerel	*Scomberomorous commerson, S. guttatus, S. lineolatus*
Kerisi	Threadfin bream	*Nemipterus virgatus, N. peronei, N. nematophorus, N. japonicas, N. bathybius, N. hexodon, N. marginatus, N. mesoprion, N. nemurus, N. thosaporni, N. nematopus, N. furcosus, N. tambuloides, N. isacanthus,*