Mekanika: Majalah Ilmiah Mekanika

Lunch Box Innovation Product Design In The Millennial Era

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Abstract
Almost all kids still bring a lunch box and a bottle of water in theirbag when they go to school. His mother always prepares a lunch box complete with a drinking water bottle, hoping that his son can enjoy his favorite lunch and avoid starvation. Sometimes the mother is distraught when the child has brought the lunch box, but the water bottle is left behind. Then the motherwas willing to take her child's water bottle to her school. This is certainly not expected by either the mother or the child. As a form of concern for the authorto this problem, the author proposes a lunch box design with a lunch box lid that also functions as a drinking water bottle. The idea of this design proposal is one grab. Both are food & drink in your hand. The goal is how to make kids can grab their food and drink quickly and practice. So, it is proposed to modify the top cover of the standard food pack to become a drink bag. The design process begins with analyzing market needs, making sketches, creating 3D design models using the Autodesk Inventor application, material selection, and product evaluation.

1 Introduction

In the millennial era, like now, quality of life is defined as the result of combining living conditions and control of the environment around us. Balanced nutrition is essential for a healthy life [1]. To achieve this condition, the body must receive an adequate supply of nutrients, especially at midday when the body has lost much energy to work starting the morning. A lunch box is a helpful tool that is handled between food and consumers; its primary functions are to protect and store food [2]. Therefore, a product used to store and carry food should have appealing colors, shapes, and materials. In this regard, the increased competition in the lunch box and food packaging market is forcing companies and researchers to invest in a functional design that generates a positive emotional experience in the interaction between user and object, exploring, for example, the fact that materials with pleasant textures provide comfort through touch, the fact that balanced colors allow the product to convey pleasant sensations through sight, or of the fact that the shape of the product can trigger memories associated with other products or references to nature [3]. All the factors that allow a product to trigger an experience are intended to add value to it to stand out and meet the consumers' preferences [4].

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That said, we wanted to create an aesthetically product to store, protect and carry meals, to the workplace, while traveling, and may be on the school, to be used either daily or occasionally [5]. The product containing food functions requires several basic requirements [6]: containment, protection, reservation, communication, machinability, convenience in proper shape, adapted to the use of the product it contains a friendly environment. Based on this explanation, in this study, the author proposes a lunch box design combined with a drinking water container in one hand. This ensures that food and drinking water are always carried and not left behind.

2 Experimental Methods

2.1 House of quality

We have to know what the market wants, so we need to make a market call. Have a short talk with someof the people that routinely use a food pack for their children every day to make a children's lunch at the school. In another way, market calls are applied by using an internet survey. It is so easy to spread our questionnaireto our target that we hope we can get many things and information from them. Our target is just forpeople living in Malang who have a 6th-35th year-old. The gender has some amount, half of them are women, and the others are men. We take the survey is about five days continuously from 4th-8th May 2020, from 08.00-13.00 o'clock. After we have the data, we convert all of them to be a technical specification of our product.

Quality Function Deployment (QFD) is a method to capture requests from users through Voice of Customer (VOC) and then apply them to become a product with good functions. For this QFD to be implemented, a framework called the House of Quality (HOQ) is needed. House of Quality (HOQ) translates customer needs or requests, based on market research and benchmarking data, into the amount that meets the target that must be met by the new product design. Figure 1 shows the house of quality of the proposed product.

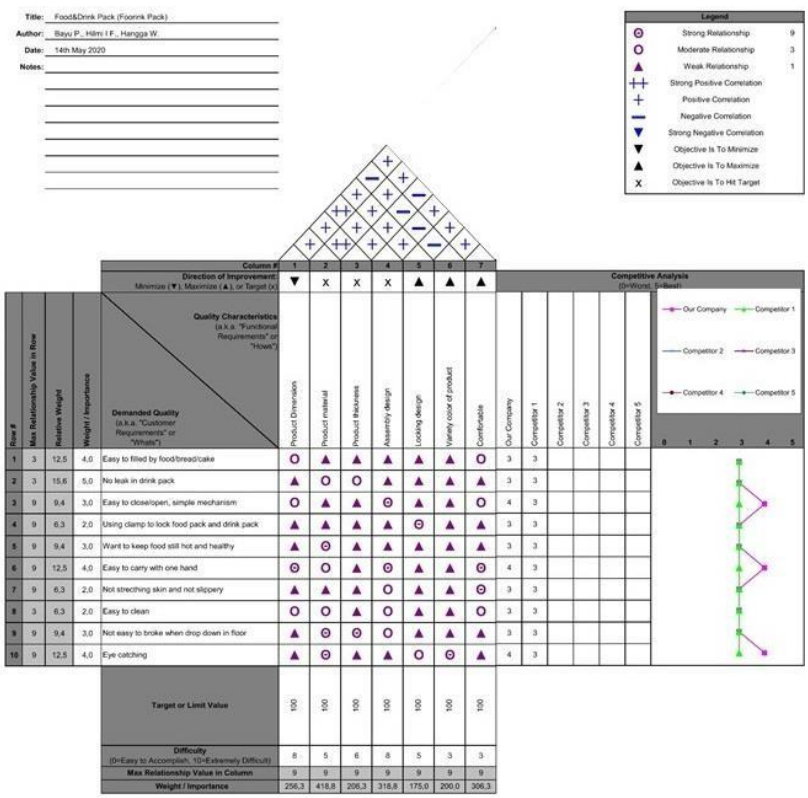


Figure 1. House of Quality (HOQ) of the proposed product

2.2 Product requirement analysis

Identification of customer needs is an integral part of the concept development phase, which is one of the phases in the product development process. The resulting list of customer requirements guides team members in setting product specifications, creating product concepts, and selecting product concepts for further development. As shown in Table 1.

Table 1. List of requirements of the proposed product

		List of Requirement **Product name: Flooring (Food&Drink) Pack**	**Page 1 of 1**
Rev.	T/H	Item	PIC (Person in Charge)
		1. Function	Engineering
	T	a. Accessible to filled with food/bread/cake	Engineering
	T	b. No leak in the drink pack	
	T	c. Simple Mechanism	
		2. Safety	Engineering
	T	a. No sharp edges	Engineering
	T	b. Easy to handle	Engineering
	T	c. Use a material specified for food	
		3. Ergonomic	Engineering
	T	a. Light dimension	Engineering
	T	b. Unslippery	Engineering
	T	c. Easy to clean	
		4. Cost	Production
	H	a. Low production cost	Marketing
	H	b. Low market cost	

Whereas:

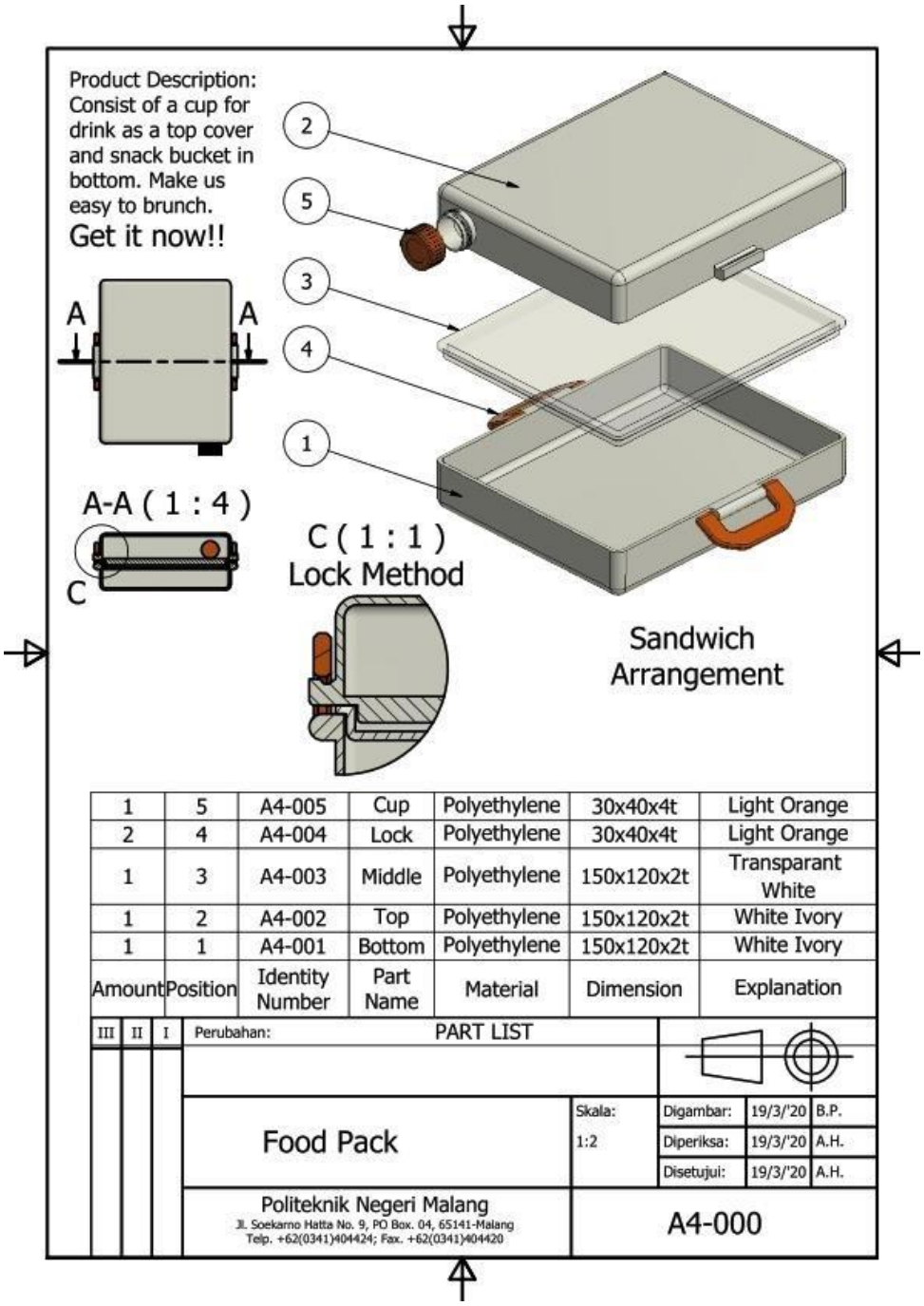
T: Term

H: Hope

3 Results and Discussion

3.1 Detail drawing and explanation of proposed product

The next step is to make a product design based on the table of consumer needs and the House of Quality. Every aspect of consumer needs must be implemented in product design to get a design that fits the needs of consumers and can compete in the market. Figure 2 shows a drawing of the proposed product design. The design interprets the consumer's desire where each geometry is made as smooth as possible and minimizes sharp corners by giving it a radius. It also considers how the product is processed using injection blow molding. Ease of assembly between components is also an important consideration. This is also based on the ease of maintenance and cleaning of the product to minimize dirt deposits that may interfere with consumer appetite.



Amount	Position	Identity Number	Part Name	Material	Dimension	Explanation
1	5	A4-005	Cup	Polyethylene	30x40x4t	Light Orange
2	4	A4-004	Lock	Polyethylene	30x40x4t	Light Orange
1	3	A4-003	Middle	Polyethylene	150x120x2t	Transparant White
1	2	A4-002	Top	Polyethylene	150x120x2t	White Ivory
1	1	A4-001	Bottom	Polyethylene	150x120x2t	White Ivory

III II I Perubahan: PART LIST

Food Pack

Skala: 1:2

Digambar: 19/3/'20 B.P.
Diperiksa: 19/3/'20 A.H.
Disetujui: 19/3/'20 A.H.

Politeknik Negeri Malang
Jl. Soekarno Hatta No. 9, PO Box. 04, 65141-Malang
Telp. +62(0341)404424; Fax. +62(0341)404420

A4-000

Figure 2. Design drawing of the proposed product

3.2 Rendering

After the design process has been completed, the next step is to convert the 3D lunchbox model into a simulation image through a process known as rendering. This rendering process combines the harmony between 3D model materials, viewing angles, and lighting. These aspects are arranged so that the rendering results can resemble natural objects that are realistic and attractive. (see Figures 3 and 4)

In addition, it also serves to attract consumer interest in the proposed product and provide an overview to consumers regarding the product. In other words, the rendering step is done for presentation and marketing purposes. The community can accept the product and make it easier to enter the market for goods or similar products and compete strongly.

Figure 3. Rendering result of the proposed product

Figure 4. 3D printing result as a prototype

4 Conclusions

The product design stages, starting from making a list of product requirements and product design to product marketing, are essential steps in making products that are attractive and accepted by the market. Clarity of concept and ease of use are essential aspects that a product must meet. Therefore, analysis using a quality house becomes vital in determining the specifications of a product that is superior or at least better than existing similar products. The breakthrough of the lunch box lid, which also functions as a drinking place, focuses on developing a standard lunch box. With this innovative lunch box design, it is hoped that it can start a new trend, especially in product design.

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