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BRAILLE PANDUAN FARDU AIN

AMIRUL LUQMAN BIN MAT YUSOFF	**08DBK20F1013**
MUHAMMAD ASYRAF BIN IZANI	**08DBK20F1009**
SYAHIRAH BINTI MOHD ROSDI	**08DBK20F1003**

CIVIL ENGINEERING DEPARTMENT
POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SESSION 1 2022/2023

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1. **AMIRUL LUQMAN BIN MAT YUSOFF 08DBK20F1013**
2. **MUHAMMAD ASYRAF BIN IZANI 08DBK20F1009**
3. **SYAHIRAH BINTI MOHD ROSDI 08DBK20F1003**

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DECLARATION OF ORIGINAL AND OWNERSHIP

1. We are second-year Diploma students in **Wood-Based Technology, Civil Engineering Department, Politeknik Sultan Salahuddin Abdul Aziz Shah.**

2. We acknowledge that our 'Braille Panduan Fardu Ain' is not taken or copied from any party but rather the work/design of our group itself.

   Made and genuinely acknowledged by the said;

   a) Students Signature :

      Student Name : Amirul Luqman Bin Mat Yusoff

      No Matrix : 08DBK20F1013

      Date :

   b) Students Signature :

      Student Name : Muhammad Asyraf Bin Izani

      No Matrix : 08DBK20F1009

      Date :

   c) Students Signature :

      Student Name : Syahirah Binti Mohd Rosdi

      No Matrix : 08DBK20F1003

      Date :

APPROVAL SHEET

Checked by:

Supervisor **:** Abdul Razli B Abdul Rahim

Signature :

Date **:**

Verified by:

Project Coordinator **:** Zullhyzrifee Ishraf Bin Zulkifly

Signature **:**

Date **:**

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ABSTRACT

Fardu Ain Braille Guide is a product designed in a game design that focuses on the knowledge of fardu ain which is also divided into three parts namely the prayer guide, the ablution guide, and the pillars of Faith & Islam, especially for the visually impaired children aged 7-12 years. The law in Islam for the visually impaired to practice fardu ain knowledge is circumcision on the condition that they can think, reason, and mature and is different in terms of tackle, which is the imposition of the obligation of practice on the individual. Braille Panduan Fardu Ain is a product that uses various other materials including laminated plywood, magnets, ball bearing, and plastic. In addition, the production of this product uses a laser cutting & engraving machine that can save the production time of the product a short time and it is the main focus of the production of this product. Based on the observations carried out, the learning method using Fardu Ain's Braille Guide is very helpful in learning and understanding in a shorter time. However, some factors can be improved in terms of content and material selection.

ABSTRAK

Braille Panduan Fardu Ain adalah satu produk yang direka dalam rekaan permainan yang menfokus kepada ilmu fardu ain yang juga terbahagi kepada tiga bahagian iaitu panduan solat, panduan wuduk dan rukun Iman & Islam khas untuk kanak–kanak kurang upaya penglihatan berumur 7-12 tahun. Hukum dalam Islam bagi golongan orang kurang upaya penglihatan mengamalkan ilmu fardu ain adalah disunatkan dengan syarat mereka boleh berfikir, berakal dan baligh dan berbeza pula dari segi taklif iaitu pembebanan kewajipan sesuatu amalan ke atas individu. Braille Panduan Fardu Ain adalah produk yang menggunakan pelbagai jenis bahan lain antaranya Laminated plywood, magnets, ball bearing dan plastik. Tambah lagi, penghasilan produk ini menggunakan laser cutting & engraving machine yang dapat menjimatkan masa penghasilan produk dalam waktu singkat dan ia merupakan fokus utama penghasilan produk ini. Berdasarkan pemerhatian yang dijalankan, kaedah pembelajaran mengunakan Braille Panduan Fardu Ain amat membantu dalam mempelajari dan memahami dengan masa yang lebih singkat. Walaubagaimanapun, terdapat beberapa faktor yang boleh ditambah baik dalam aspek isi kandungan dan pemilihan bahan.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Blindness was defined as 3/360 (finger counting at three meters) by The World Health Organisations (Vaughan, Asbury, and Riordan-Eva 1999). In context, it has been emphasized that the measurement of visual acuity, which figures 6/60 does not represent a fraction. This context means that a person with a visual acuity of 6/60 will be able to see at 6 meters as a person with normal vision can see at 60 meters (Best 1992). The raised dot system is braille invented by Louis Braille in the 1820s (Jernigan 1994). A basic Braille symbol is called a Braille cell, consists of six dots and is arranged in a rectangular formation, with three high points and two horizontal (figure 1).

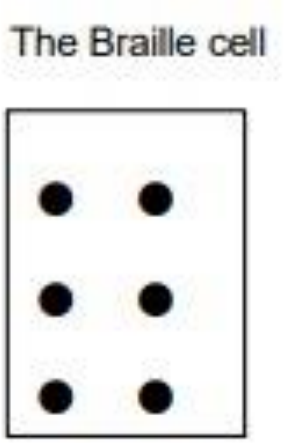


Figure 1: Basic braille symbol

The number of characters used is reduced to form a word, therefore, the Braille system makes use of contractions, such as a single letter, or a combination of letters or symbols that represent a word. When braille characters are formed by combining six raised dots arranged in a 3 × 2 matrix, it is called a braille cell. The number and order of these dots distinguish one character from another. Because various braille alphabets originate as transcription codes, even in English Braille there are 3 levels of braille, which is uncontracted braille meaning letter-by-letter transcription used for basic literacy. Both contraction braille where the addition of abbreviations and contractions is used as a space-saving mechanism and grade 3, a variety of non-standard personal shorthand that is rarely used.

In addition to braille text (letters, punctuation, contractions), it is also possible to create illustrations and raised graphs, with lines either solid or made of a series of dots, arrows and bullets larger than the braille dots. A full braille cell is one that includes six raised dots and is arranged in two columns, each column having three dots.

1.2 Objective

Some of non -governmental organization (NGOs) aims to promote Islamic teachings among the visually impaired in Malaysia. We have Persatuan Orang-orang Cacat Penglihatan Islam Malaysia (PERTIS). Although these NGOs have introduced and taught Braille in Prayer guide braille, Ablution guide braille, Pillars of Faith & Islam braille. We aim to:

I. To create additional learning aids for visual impairments.

1.3 Problem Statement

Before this product is produced or carried out, a clear purpose has been presented where it aims to solve problems such as the lack of braille reference materials, fardu ain guides in physical form or products. In addition, it also aims to overcome learning problems directly as it is customary to only read and write on paper. Next, this product is an improvement in terms of the ball bearing problem on the game board which is easily detached.

CHAPTER 2

LITERATURE REVIEW

2.1 The Development, Changes a,nd Contribution of Braille

Louis Braille (1809-1852) was born in France. While playing in his father's workshop at three, he injured his right eye with a cobbler's tool. At that point, no medical knowledge could save his sight; even Louis's left eye became inflamed, apparently due to subsequent sympathetic ophthalmia, and he eventually lost sight in that eye. At the age of five, Louis Braille was utterly blind. Because of this, he is considered the inventor of the tactile writing system that bears his name, the Braille system. This revolutionary system has allowed the blind to access written culture, and as such, it can be considered a significant advance in the quality of life of the blind. The immediate precursor to the invention of the Braille system was the alphabet created by Charles Barbier de la Serre (1767-1841), in which he created a tactile language designed for military and private use. Louis Braille modified this alphabet into the Braille alphabet, practically the same as the alphabet used today. This matter needs time to be recognized and implemented as a method of reading and writing for blind people worldwide. In 1950, UNESCO effectively universalized the Braille alphabet, and the Braille system as "an important communication language, as valid as all other languages in the world", was recognized in 2005 (Javier Jiménez, Jesús Olea et.al, 2009).

Louis Braille was called by his first biographer "Johannes Gutenberg, for the blind". After a puncture wound to his eye caused by sympathetic ophthalmia, he became blind. At 16, he invented a simple and ingenious method that enabled blind people to read and write. However, the day's teachers rejected his system of six high, palpable points because it claimed a gap between a blind man and full sight. Nevertheless, despite this opposition, the Braille system is still thriving because of its advantages for the blind: Nowadays, this method is used worldwide (Klin Monbl Augenheilkd, 1977). Braille has united the visually impaired as a result of the creation of a writing system by Louis Braille that is universally used and adapted over time to different alphabets and new technologies (A. Sabiani, 2015). For how blind people "see" Braille, lessons from functional magnetic resonance imaging What does the visual cortex of blind people do when reading Braille? This process involves converting simple tactile information into

meaningful patterns that have lexical and semantic properties. The somatosensory system may mediate the perceptual processing of Braille, while visual letter identity is achieved in the visual system in sighted people. Recent advances in functional neuroimaging techniques, such as functional magnetic resonance imaging, have enabled the exploration of the neural substrates of Braille reading. The primary visual cortex of early-onset blind subjects is functionally related to Braille reading, indicating that the brain exhibits remarkable plasticity that potentially allows additional tactile information processing in visual cortical areas (N Sadato, 2005).

2.1.1 Print Changes

The print, believe it or not, looked quite different in the early 1960s than it does today. On July 31 July 31, 1961 -- fifty years ago this coming weekend -- IBM's new typewriter went on sale. The IBM Selectric typewriter (Figure 2) reinvented the typewriter by introducing the typeball. A spherical metal object mounted inside the machine would spin and rotate with each keystroke before slamming into the ribbon that anchored the page. The type ball replaced a series of individual type bars, known collectively as baskets, which made maintenance difficult and limited speed; if you type too fast, the bars will jam together. However, it is more than that. The Selectric was designed by Eliot Noyes, a U.S. architect, industrial designer and curator. at the Museum of Modern Art, she worked under Walter Gropius and Marcel Breuer. Like Apple in its simplicity, the original Selectric is without unnecessary parts; it is the ultimate example of the form-following function principle that guided modern architecture and defined the Bauhaus under Gropius.

Figure 2: IBM Selectric Typewriter

Since word of Selectric's superiority spread, sales of the typewriter increased to 75 per cent of the U.S. market. During the 23 years the Selectric was IBM's flagship typewriter, the company continued to improve on Noyes' legendary design, releasing the Selectric II in 1971 and the Selectric III in the 1980s. Although the Selectric II used the same typing elements found in the first typewriter, it was equipped with a dual-pitch option that allowed the operator to switch between 10 and 12 characters per inch. The Correction Selectric II, a modification to the second model, was released in 1973. It held one of two correction ribbons that the company began selling: one, called a "lifter tape", was adhesive and would try to pull the ink off the page; the other, "covering tape", punches white ink over letters that need correction. In addition to the standard original model, IBM introduced the Magnetic Tape Selector Typewriter in 1964 and the Magnetic Card Selector Typewriter in 1969. Both units featured magnetic storage devices, making them among the first machines to provide word-processing capabilities. By the time the Selectric III came out, the entire industry had caught up with IBM, and the machine was starting to become unusable. In 1984, the Wheel writer replaced Selectric as IBM's flagship model. The Wheel Writer features advanced word processing and electric memory and allows for multiple typefaces; after more than two decades, the Selectric cannot compete with it (Nicholas Jackson,2011).

2.1.2 Braille Changes

Simplicity and comfort The Braille code system has been widely adopted in some communities. Other languages such as English, Arabic, Hindi and others also support Braille (D Saad et al. 2010). However, few studies have been conducted on Braille for smartphones. Along with the advancement of technology, the mechanism of the Braille script became an important research domain. Perkins Brailler (Figure 3) was the first device introduced to facilitate braille writing for this category. In the Perkins Brailler design, there are space, backspace and line space keys and keys that correspond to each of the six dots in the Braille code (J. O. Bickford and R. A. Falco, 2012).

Figure 3: Perkins Brailler

The NavTouch keyboard or braille taps for mobile devices was developed by (T Guerreiro et al, 2008). This keyboard layout divides the alphabet into five rows, starting with a vowel in each row. Users can navigate these rows by performing navigation gestures in four directions: up, down, left, and right. Both vertical and horizontal navigations are cyclical. Audio feedback is also provided in order to locate the desired letter. Three groups of five users, who had no previous experience in mobile text entry, evaluated designs. Users were first trained on the text entry method. Results indicated that NavTap outperformed other layouts. However, these keyboards require both hands to operate, which is difficult for visually impaired people. This study was conducted on a Braille keyboard design that uses six specific screen locations on a touchscreen device for Braille code entry. To enter data, the user will face problems simultaneously in operating multiple fingers and both hands because it requires both hands of the user,

specifically three fingers from each hand, to enter one character. To operate this keyboard, blind users must move the phone away from their faces, which can be uncomfortable and lead to privacy violations. This forces the user to write at a fixed location called out on the screen, which is a burden to the visually impaired who struggle to keep track of the location. Several usability experts evaluated Braille Touch. Two visually impaired users thought the most common response was to provide position-independent text entry that did not require distance between the user and their phone (B. Frey et. al., 2011).

As ordinary people know that learning mathematics is essential for us, so it is also crucial for blind people. Braille calculators are designed so that visually impaired people can learn math quickly. Input is taken from a touch screen device, and here are the details of the Braille Calculator (Figure 4), which uses a 2.8-inch touch screen, four-wire resistance and the screen is divided into six sections for text entry (Y. V. Gidh 2013).

Figure 4: Braille Calculator

2.1.3 Braille Reading Accuracy

Braille reading is a particular and active touch process involving fingers, arms, and elbows based on (Millar, 1997). The appropriate hand movements for reading Braille depend on the brain's asymmetry, each finger's sensitivity, and the training received in the early stages of learning (Lorimer, 2002). A recent hypothesis suggests that the level of touch sensitivity required for braille reading is reached during the initial reading stage, and no further increase in spatial resolution of touch occurs (Veispak et al., 2013). Braille reading requires sensitivity and a functional touch space so that the reader can

identify the relative spatial position of the braille dots and finally obtain the maximum amount of information from each braille character (Vakali & Evans, 2007). Phonological awareness, verbal short-term memory skills supported by auditory processing, and speech perception abilities are additional factors that determine the level of braille reading.

Nevertheless, it remains to be seen to what extent Braille Readers (Figure 5) decode each character individually or whether they also develop larger perceptual units (Veispak, Boets, & Ghesquiere, 2012). The idea that skilled braille readers use lexical, contextual and perceptual cues to achieve rapid reading is supported by (Millar, 1997), while (Hughes, 2011) has suggested that braille reading imposes continuous sequential decoding. Finally, cognitive strategies may be used by braille readers who are more or less the same from the beginning to read words that do not fundamentally change during their academic growth and development (Veispak, Boets Mannamaa, & Ghesquiere, 2012).

Figure 5: Braille Reader

(Dodd and Conn, 2000) Estimated that braille readers who participated in their study were approximately ten months behind their peers in accuracy, while according to (Veispak et al., 2012), Some studies show that braille readers read slightly less accurately compared to print readers. In addition, (Vakali and Evans, 2007), when students with vision problems became more experienced readers, they also became more accurate readers, while students in the ABC Braille Study began to show deficiencies in acquiring higher-level decoding skills after grade 2 (Wall Emerson et.al., 2009). According to the ABC Braille Study researchers, the increased stress on readers

is evident as they move up in age and grade because they are faced with more relevant reading or lack adequate instruction or training (Wall Emerson et al., 2009).

Finally, short words provide precise reading accuracy with their fingerprints being sensitive enough not to burden verbal short-term memory and when semantic information cannot be used to aid comprehension. In addition, the categorization of braille reader error patterns has yet to be thoroughly studied, and the effect of knowledge in this field is limited. Some researchers believe that the position and density of braille dots affect the recognition of braille characters (Challman, 1978).

2.2 The Position of Taklif in the Implementation of Worship for the Visually Impaired

2.2.1 Introduction

The primary matter of fardu ain is the meaning of Islamic education here. Knowledge is obligatory for every Muslim who has reached puberty to learn, know and practice it related to Aqedah, Sharia and morals (Abdul Halim, 1991).

Allah SWT has glorified the human race by placing the responsibility of world leadership on their shoulders to bring prosperity to the face of Allah's earth. However, it must be guided by His message and Sharia. Because Allah s.w.t has gifted people with common sense to distinguish between good and evil in their lives, thus being able to govern this earth with the path of justice and piety. In terms of reason, it can be said to be the highest blessing that Allah s.w.t has bestowed on humans, which is the axis of taklif law as the source of authority for the implementation of responsibility according to Sharia. Nevertheless, man's absolute power is not the law of reason to be used as the principal balance of weights and measures; it needs to be guided by Allah s.w.t revelation and the Sunnah of His Messenger. However, Allah s.w.t created humans with various abilities, from a physical or mental point of view. This matter is the same as Allah s.w.t created them: humans of various races and skin colors to get to know each other and understand each other (AlSyaʿrawi, 1997). Some people are tested with a lack of self, and this test causes them to have limited abilities such as mental, visual, hearing, speech and physical disabilities.

Nevertheless, this group does not fall from the invitation to worship; they are also required to perform worship based on their abilities (Azab, 2015). Islam is a religion

that stands on Sharia, which is easy to follow and practised mainly for people with disabilities (OKU) as a sign of Allah SWT's love for His servants. This also proves that the Shari'a emphasizes the welfare of their worship (Azab, 2015). Therefore, the law of taklif on the disabled group must not be the same as the regular group from the point of view of implementation and specific laws.

2.2.2 Definition of Taklif & Related

The meaning of imposing (handing over) the burden to something from a language point of view is Taklif. In contrast, from a syarak or terminology point of view, it is responsible for the effect of Khitāb (order) Syarak (Al-Mirdāwi, 2013). According to al-Anṣāri (2017), from the point of view of the term taklif also means the responsibility of a burden to someone, either in the form of an act or leaving something forbidden. The intended burden covers the conversation and actions of the mukalaf based on the effects of orders or prohibitions through syarak texts from the Quran, hadiths and syarie ijtihad such as qias and ijmak (Al-Syārikh et al., 2019).

The law of taklif is divided into five parts: obligatory, circumcision, harus, makruh and haram (al-Zuḥayli, 2006). Several conditions are subject to this taklif law, where the position of these conditions is divided into two, namely conditions that refer to individual mukalaf (Maḥkūm ʿAlaih) and conditions that refer to mukalaf (Maḥkūm Fīhi) (al-Namlah, 1999). Referred to table 1 and table 2 in the appendix.

2.3 Jawi Braille

2.3.1 History of Jawi Braille in Malaysia

Based on the Education (Special Education) Regulations 2013. Education for students with special needs in special schools or schools that implement Special Integration Education Programs or Special Inclusive Education Programs at preschool, secondary education, or post-secondary levels is the meaning of "Special Education". The particular education program for students with special needs (MBK) in terms of vision problems still under the government began with the establishment of the Princess Elizabeth Special Education School in Johor Bahru in 1948. Meanwhile, since the beginning as early as the establishment of the Princess Elizabeth Special Education School (Figure 6), religious education for students in this particular school continues to

be given, where the placement is still boarding in welfare homes of various communities and various problems and Islamic religious education in this school is under the responsibility of the Johor Islamic Religious Department. Religious teachers were also brought in from the Johor Religious Department (Zakaria Yahya, 2011).

Figure 6*:* SKPK Princess Elizabeth, Johor Bahru

Jawi Braille is closely related to Islamic education and sacred texts. This is because most antique books are written in Jawi script. Initially known as the 'Standard Indian Braille'(Figure 7) code, the Jawi Braille code was established in India as early as 1947 and was once proposed globally for standardizing the Arabic code (Mustaqim, 2014).

According to (Zakaria Yahya, 2011), the President of PERTIS, the first head teacher at Princess Elizabeth Special Education School, and Major D.r. Bridges was also an officer who had worked on the Jawi Braille writing system. However, Jawi Braille still needed to be used.

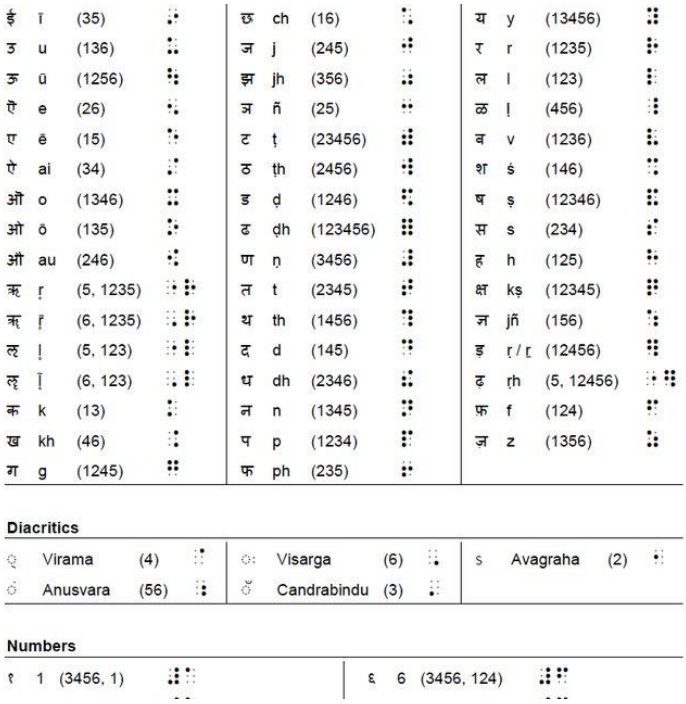


Figure 7: *Standard Indian Braille*

Their attempt to adapt Jawi writing has produced the production of alif letters until here with almost the same sound matching between Roman letters and Jawi letters by using different Braille points from the current Jawi Braille system (Mustaqim, 2014). This is because there needs to be a detailed guide for Jawi Braille's writing methods. Despite the absence of the Jawi Braille writing system, religious studies at Princess Elizabeth School continued. However, due to the lack of resources, the teaching approach only used listening and rote methods. The first instructor for the religion class was Mr Haris, who had no training to teach visually impaired Special Needs Students (Mustaqim 2014).

According to (Zakaria Yahya, 2011), the history of the Jawi Braille writing system began in October 1954, after the Johor Islamic Religious Department sent a religious teacher named Cikgu Sulaiman Shafie (Figure 8) to Puteri Elizabeth School to teach Special Needs Students with eye problems. However, he is a visionary teacher who lacks Braille ability and has never been trained to teach Special Needs Students with this vision issue. To fulfil his duty as a teacher in terms of honesty and felt, he learned Braille by himself.

Figure 8: Cikgu Sulaiman Shafie, 2009

In the beginning, he learned Roman Braille from his students and later switched to Jawi Braille, using Al-Quran Braille, which the school obtained from Jordan around 1953, as a reference to know the letters of the Quran. He began to study it more carefully and compared the Braille Quran with the standard Quran. In addition, the Qur'an's letters and punctuation marks are distinguished from ordinary mashaf. As a result, after a long time, he understood hijaiyah Braille letters, Braille writing procedures and Braille lines and dots in the Quran (Mustaqim 2014; Zakaria Yahya 2011). Cikgu Sulaiman Shafie started an experiment to copy religious books started by Cikgu Sulaiman Shafie as a result. All religious books such as textbooks from the Department of Islamic Religion in Johor that contain the subjects of monotheism, tafsir, tajwid and more are written in Jawi script. As a result, he has converted the textbooks to Jawi Braille writing. This is because Puteri Elizabeth school not only follows the same curriculum as other schools but also has its education system run by the Johor Department of Islamic Religion. Efforts to copywriting into Jawi Braille writing were made alone due to the lack of braille printing equipment. Following the introduction of the first 'thermoform' machine, a Braille printing machine by Malaysian Association for Blind (MAB) in March 1956, the machine was approved by Princess Elizabeth's school. As a result, more textbooks are transcribed into Jawi Braille using Braille paper. His contribution did not stop there because he started serving as a Jawi Braille instructor to the religious teacher who will be teaching at the Princess Elizabeth Special Education School.

He was also tasked to transcribe the questions of visually impaired Special Needs Students under the Department of Islamic Religion in Johor. As a result, Jawi Braille is now becoming more popular. It is also taught in the Braille Application course of al-Quran and Sunnah studies for literate students at the Public Institution of Higher Education Malaysia, Universiti Sains Islam Malaysia (USIM). Code exposure to students is not only to Al-Quran Braille code but also to other languages. The following way to read Braille code is Jawi Braille. They also do not miss learning how to operate the Perkins Brailler machine and ICT, such as the Duxbury Braille Translator program (Noor Najihan, 2012).

2.3.2 Introduction to Jawi Braille

The word Jawi comes from the name of the land, 'Alam Malay, while Jawi writing is a Malay writing system that uses Arabic letters as the basis (Amat Juhari 1996 & Hamdan 2015). Due to the use of Arabic letters paired with newly formed Malay letters, this writing is also known as Arabic - Malay writing (Hamdan, 2015). Braille refers to a writing system for the blind that consists of raised dots that indicate certain characters and can be read using the touch of the fingertips and that uses a code with its own set of rules and ways of operation (Mustaqim, 2014).

Louis Braille invented it by adapting military letters to make it easier for soldiers to read writing in the dark. Braille writing is raised writing that can be felt using the fingertips, especially the index and middle fingers. It consists of a combination of six dots arranged in 'Braille's cells that will become letters (Zakaria, 2011; Adam, 2012). Each Braille cell will represent a letter, numbers and punctuation marks. So, with that, the word will be formed by combining all the cells. The dots in this six-dot braille cell are arranged as follows: dots 1, 2 and 3 are on the left side of the cell, while dots 4, 5 and 6 are on the right.

This conventional Jawi is quite different from Jawi Braille's writing to align Jawi writing with the Jawi Braille code (Figure 9). Braille codes in this Jawi Braille writing will represent Jawi letters. The diagram on the next page displays Jawi letters as Braille code. Therefore, in conclusion, Jawi Braille is a Jawi script based on Arabic letters added with new letters to symbolize the sounds of Roman letters and transcribed into the emerging Braille code. Braille writing has a specific writing method used as a

medium of information delivery—pupils with special needs, disabled, visually impaired or visually impaired.

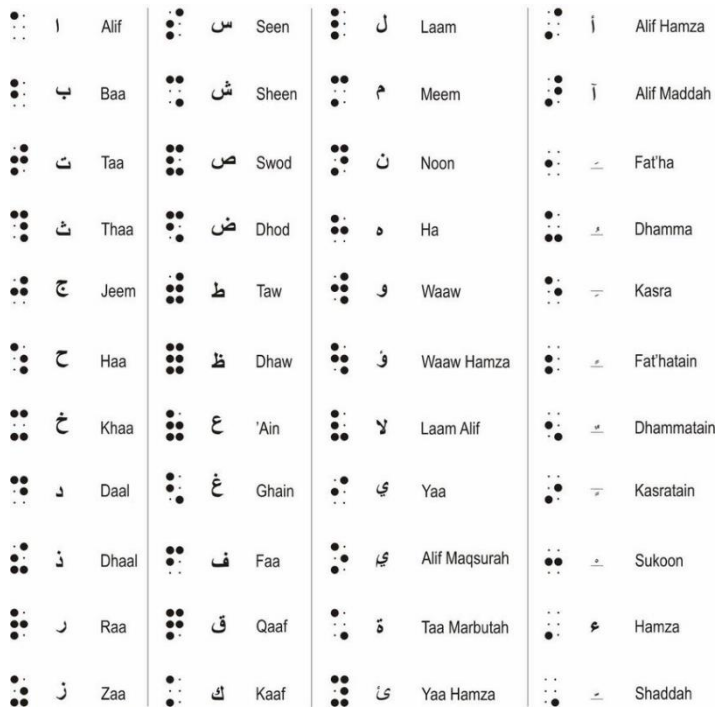


Figure 9: Jawi Braille Code. Source Mustaqim, 2014

2.4 Teaching Method for Visually Impaired Children

2.4.1 Introduction

Ordinary students do not only learn Jawi. It is also studied by visually impaired people students with special needs, while teachers who teach students with visual impairments need to have teaching skills that suit their needs. Therefore, the teacher needs to have the basics of the Braille Code, as well as the skills to use a Braille machine and read Braille before choosing an appropriate teaching and learning strategy (Mohd Mokhtar & Aliza, 2004). To achieve the lesson objectives, teachers should think of teaching strategies to meet the needs of students from various levels of mastery and integrate their teaching methods to form effective teaching and learning. In order to maximize time and minimize unproductive activities, the method to be used needs to be selected and planned, while the uncertainty of method selection is caused mainly by differences between the subject of the lesson, the teacher and the student. Using various teaching methods will make learning more efficient and increase student motivation to learn.

However, the selection of the appropriate method should be based on the level and abilities of the students.

Through the dictation method, they were listening and speaking, a method using the sense of hearing. The teacher will say a letter or syllable, and then the student will repeat the sound before continuing to write. This method is very effective and will make it easier for students to identify letters or words through the sounds of the letters. Not only can it be used by teachers, but teaching aids (BBM) can also be used so students can speak through audio materials. For first grade, the teacher only needs to say the Jawi letters and the Braille code for the letter; then, the students say the Braille code. It shows that students are only emphasized to say the Braille code without saying the Jawi letters through this method. This method gives students an advantage to guess and adjust the sound of syllables in spelling and fosters thinking skills in learning Jawi. In addition, it will also improve the student's listening and speaking system with correct and easy-to-remember pronunciation. Identifying sounds by adjusting letters is an active process because it elicits students' responses. Also suggests that this method is used to overcome students' weaknesses in reading Jawi texts. However, this method requires quite a long period to teach students of different mastery levels in one class because the teacher has to move and repeat everything one by one repeatedly to individual students in case some students are behind. Therefore, it will take longer (Nik Rosella, 2007)

Drilling is a method of repeating the fact, sentence, or efficacy being studied, also known as the concept of 'Tikrar (Figure 10), which means repetition. Repetition occurs when the teacher or student repeatedly mentions the same thing. This goal is intended for students to achieve a high level of mastery in reading and memorization and ensure that they remember it well. This method is always used primarily for students who are weak and have other problems besides vision problems, not only for reading and writing Jawi Braille but also for Braille machines and correct fingering systems. It is based on the syllabus that has been prepared.

Figure 10: Tikrar Method used in memorizing Qur'an

2.5 Toys for Education

During the growth process of children, education is essential for them because this will educate them towards knowledge and experience in the future. When it is mentioned about educational toys it has become one of the tools used to teach children that can help them in many aspects, little by little. In addition, educational toys have also become an essential tool for children's development in stimulating and extending play (Goldstein, 2012). A more careful selection of toy designs can lead children to play with others, cooperate, or develop specific skills. In addition, the development and growth of children in terms of their mental and physical are affected when playing with educational toys. Many different types of educational toys are sold in the market to teach the qualities children need to learn (Višnja Đorđić, Tubić, & Jakšić, 2016) state that this way can provide development in themselves with effects throughout the life of the process, and various aspects of development (physical, motor, cognitive, emotional, etc.) are correlated and interdependent in various ways. Almost everyone has a liking and desire to play such a game throughout the individual's life. Psychologists say that playing is not just to fill up free time, just a relaxing activity or leisure, but a significant learning experience. Play is part of children's routines and activities because "play" plays a vital role in children's cognitive, social-emotional and self-regulatory development. Therefore, play is essential for their development (Milteer, Ginsburg & Mulligan, 2012). The value of play is increasingly recognized, by researchers and in the policy arena, for adults and children as evidence grows of its relationship to intellectual achievement and emotional well-being (Whitebread, 2012). Game

materials are provided and how they are used is equally important. Therefore, children need to play in their daily lives from an early age, and the proof is that by playing, children can create new learning experiences, and these self-created experiences allow them to acquire social, emotional and intellectual skills that they cannot obtain in other ways (Elkind, 2008).

2.5.1 Braille Toys

At the beginning of how to play each new game, Blind children need to be guided. If no one tells them how to play the game, they can take it for granted, but if someone teaches them to play with the object as if it is something different, they can use this type of game automatically. For example, children from a first-grade class play with rainwater in a stone container as if it were soup. They use branches to stir the water and put some leaves as vegetables and salt. There was also a blind boy with them, and he also joined the game with the help of a girl who told him about their game and gave him a stick to stir (Moore, 2012).

In the nursery class, learning Braille and Braille Abacus is taught with simple exercises such as feeling the dots and learning the place of dots in a letter. At the beginning of class, the Braille tools are a blackboard (tablet) and a stylus (pen) (Figure 11). First, using a standard tablet requires thicker paper, and when the paper is inserted into the tablet, the tablet needs to bend from the middle, and tablet locks the paper. There is a small rectangular hole on the front of the tablet and six small dots on the back that fill the rectangular letter space. When children make points with a six-point pen helps them write correctly and efficiently. The complicated thing in this process is to start writing from right to left and write letters symmetrically and vertically. When the paper is removed from the tablet, the reading should be read from the left to write from the serrated side of the paper, which is the back of the paper. This looks pretty confusing during observation, but "the children have no difficulty with it, and they understand the difference between writing and reading in a few days", as claimed by the teacher. However, the need for symmetrical learning at this early age is fascinating (Hatice Aktürk Ablan & Nilüfer Talu, 2013).

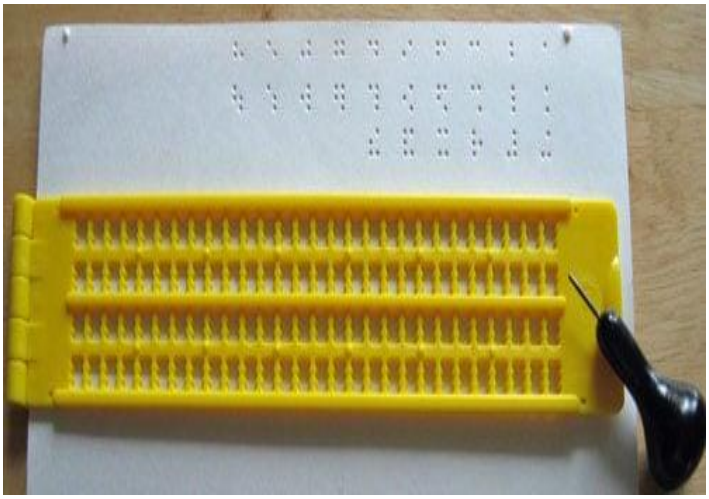


Figure 11: Braille slates and stylus

Abacus (Figure 12) is not a Braille device; it replaces the Braille device in math class as the primary tool. Children also use their Braille devices in math class. However, the use of an abacus makes the work of students easier in mathematics. Children learn how to use an abacus in math class and learn both math operations and use the abacus to calculate solutions to operations. Generally, in mathematical operations, they use both sides of the abacus to arrive at the answer (Hatice Aktürk Ablan & Nilüfer Talu, 2013).

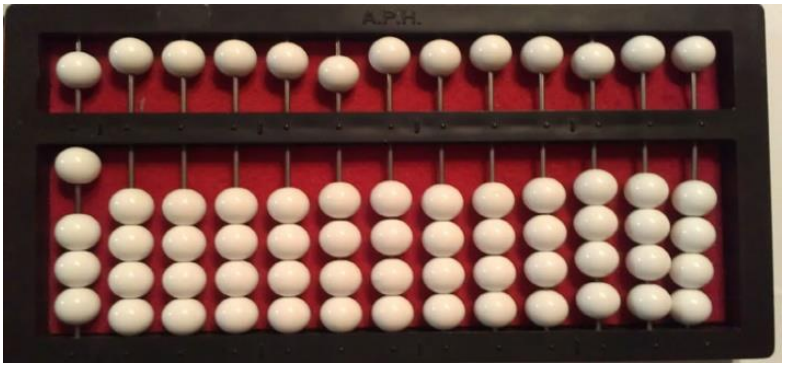


Figure 12: Abacus Used in Mathematic Classes for Blind Children

2.5.2 Toy Set Design

This housing of elements in the bag of the play set (Figure 13) is designed to improve mobility and orientation skills, create mental maps based on haptic perception, and encourage children to explore. In this study, the importance of practice is outlined. In line with the study's claims, play sets allow children to build an indoor environment that helps them practice mobility. The architectural space needs to be scaled down so that visually impaired children will practice the spatial environment on small models

by touch. The assumption is that children will learn and build space with the toy set, and in this way, they will practice mobility as part of play activities. Using their hands and fingertips, they imagine walking in the play set. They practice creating mind maps, and, in the end, they become more confident in the space (Hatice Aktürk Ablan & Nilüfer Talu, 2013).

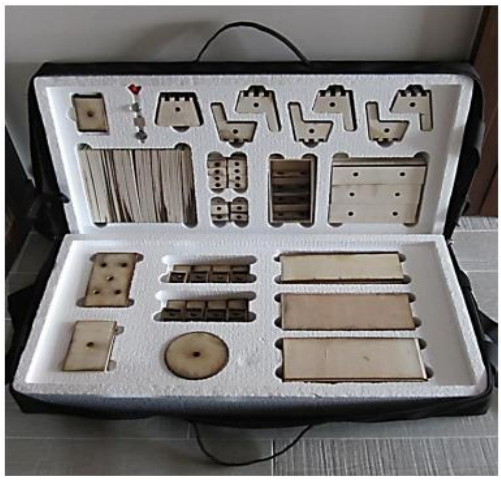


Figure 13: Housing of elements in the bag of the play set

2.6 *Persatuan Orang – Orang Cacat Penglihatan Islam Malaysia (PERTIS)*

The Malaysian Islamic Visually Impaired Association (PERTIS) was established in 1996 and held its first Annual General Meeting in August 1996. On December 5 December 5, 2021, corresponding to 30 Rabiul Akhir 1443H, the 26th Annual General Meeting was held. This association is also national. Thus, it has branches in 5 states, namely Kelantan, Terengganu, Pahang, Kedah, and Sabah. This association is indeed expanding its branches in other states. However, it depends on the demand of the target group in the respective states. Several places of activities, such as Negeri Sembilan, Johor, and Penang, are under the management of PERTIS Malaysia. This association is governed by a body known as the Central Committee Member (Central Committee) -please refer to attachment 1- Each Central Committee will lead a sub-committee known as a Bureau and can appoint Sub-Committees for each bureau. PARIS at the state level is governed by six state-level PERTIS committee members led by the chairman - please refer to attachment 2 Yang Berbahagia Datuk Zamani bin Sulaiman (Former Secretary of the National Assembly, Parliament of Malaysia) is an Advisor to this association and has 12 staff members - please refer attachment 3- at the central

PERTIS office. To ensure that the latest information reaches the knowledge of members and the community, the association has set up an info line that can be accessed 24 hours a day. The featured information will change every week. The Info Line in question is 03-22603950.

2.6.1 Objective

This association's objective, as enshrined and in force in its constitution, is to foster and strengthen the bonds of brotherhood among its special members and the visually impaired. In addition, organizing and encouraging preaching activities for the benefit of the visually impaired in Islam. Our objective is also to improve the level of education among the Islamic visually impaired. In addition, to expose, encourage and explore economic opportunities for the benefit of visually impaired people as well as to organize and coordinate any activities that aim to defend and be responsible for the welfare of the visually impaired people. Next, we aim to channel, coordinate and supervise aid or donations from organizations or individuals to people with Islamic visual impairment. Add to that, get involved in other activities that are thought beneficial to Islamic members or visually impaired people. Finally, all activities with a religious pattern should first be referred to Islamic authorities for approval and permission.

2.6.2 Exampled of Manufactured Products

** All books, including Al Quran and iqra', are produced in braille form

1. Al Quran Braille
2. Iqra’
3. Islamic education textbook
4. Arabic textbooks
5. Book of Fiqh Syafiee (2 volumes)
6. *Muqaddam*
7. *Surah Yasin & Tahlil*
8. Terawih & witr prayer book
9. Hajj, Umrah and Pilgrimage
10. 40 Hadiths about *Peristiwa Akhir Zaman*
11. *75 Doa – doa Rasulullah*

12. Prayer workshop
13. Holy practice prayer
14. *Asma Al – Husna*
15. Knowledge comes directly from Allah
16. Book Munyatul musalli

2.7 Laser Cutting & Engraving

2.7.1 Application

Various purposes have used the laser since its development. This report revolves around material processing laser cutters. Then this chapter will focus more on the use of different lasers in this field and their use in terms of properties, advantages and disadvantages. Cutting materials is one of the industry's main tasks of laser equipment. This is because of its advantages over conventional technologies, such as oxy-flame, N.C. milling, and a turbulent fluid jet, in higher processing speed and better edge quality. Of course, the first disadvantage of laser technology is that it only applies to flat workpieces. The manufacturing process is cheaper and faster when the laser is more about cutting the material because the cutting dies are only available for large quantities of 10,000 or more (Steen & Mazumder, 2010).

2.7.2 Advantages & Disadvantages of Laser Cutting & Engraving

This chapter deals with some of the advantages and disadvantages of various laser technologies compared to the traditional computer numerical control (CNC) milling machine technology and the relatively new additive manufacturing (AM) technology, sometimes referred to as 3D printing technology. Since all technologies are constantly being developed and each particular use always requires special tools, some of those things may seem irrelevant soon. One of the biggest advantages of laser machines compared to other technologies is the speed of operation. Once the laser cutting & engraving (figure 14) is set up, they can quickly do whatever job they want and produce multiple identical parts through precise repetition and no physical connection or contact point between the tool and the workpiece when using a laser. Another drawback of current laser technology is the two-dimensional work plane. Nowadays, multi-axis CNC machines can work on the workpiece at many different angles, and the workpiece is sometimes mounted on multiple moving axes. Although classic CNC machines specialize in metal and plastic parts, while the AM process can only process meltable

plastics, laser devices can be used on many types of materials. The active medium and light output ultimately determine the material's limitations, whether organic or inorganic. Setting up and operating a large laser system economic specialized personnel and training. Furthermore, the high cost of acquisition is a negative point. Because a laser machine with comparable capabilities can cost more than twice as much to buy. On the other hand, moderate operating costs are limited to electricity bills and the possible need to replace the laser emitter (Velling, 2020).

Figure 14: Machine Laser Cutting and Engraving

2.7.3 Other Software

The software used can handle several different file formats that can be imported via File -> Open. The supported file types are listed in Table 3. Every program that can export vector files with one of the supported file types can be used in this software. Images with most of the file types used can also be imported and prepared with the onboard tool set for any engraving (Markus Mayer, 2021)

2.7.4 Safety Issues

Most of the possible sources of danger come from unknown or undetermined substances. Suppose the materials are transparent and opaque plastic, for example. In that case, polymethylmethacrylate (PMMA) or acrylic glass is safe with laser devices. In contrast, materials such as polycarbonate (P.C.) and polyvinyl chloride (PVC) that

release harmful gases such as dioxin or hydrochloric acid (HCl) are not safe to use. The gases will harm the lungs and can corrode machine parts (Flux Europe, 2021) That is why special attention should be paid to unknown ingredients. Especially with thicker wood materials, there is a potential danger, such as fire. The embers produced can be further excited by pressurized air fed through the laser head. It is, therefore, crucial to remain within proximity of the machine during the cutting operation.

2.8 Material Used

2.8.1 Laminated Plywood

The lamination process is where several sheets are permanently bonded together with the help of a hard press and adhesive. Plywood has been aesthetically enhanced by the addition of decorative laminate sheets known as laminated plywood. Plywood is prepared by placing individual pieces of wood on top of each other that are bonded together using a lamination process. Veneers also known as wood chips are used in the preparation of laminated plywood obtained from logs and manufactured using a rotary cutting process. Urea-formaldehyde and Phenol formaldehyde are strong wood adhesives used for bonding purposes before the stack is passed through a hot press and laminated.

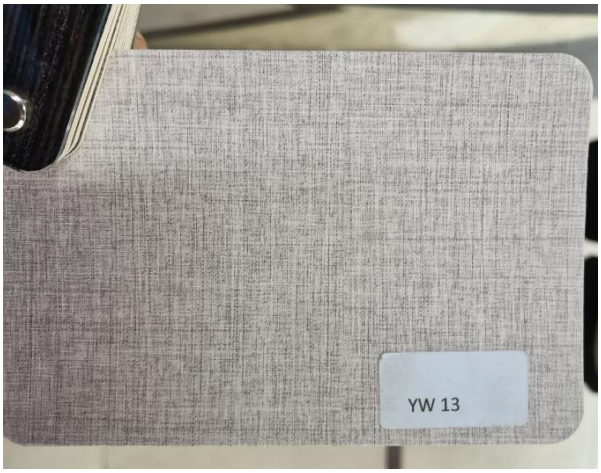


Figure 15: PVC Laminated Plywood

2.8.2 Epoxy Resin

Epoxy resins are among the best matrix materials for many fiber composites. This is true because among the reasons such as epoxy resins can adhere well to a wide variety of fillers, reinforcing agents, and substrates, also the wide variety of epoxy resins available and curing agents can be formulated to give a wide range of post-cure properties and to meet a broad spectrum of needs processing. In addition, the chemical reaction between the epoxy resin and the curing agent does not release any volatiles or water (Lynn S. Penn, 1982).

Figure 16: Epoxy resin.

2.8.3 Application of Epoxy Resin

Epoxy resins are used in various composites, and for structural parts, they are also used as potting and packing compounds, tooling compounds, molding powder, and stickers.

2.8.4 Silicone Rubber Mold

Silicone rubber has a unique synthetic elastomer made from a cross-linked polymer that has also been reinforced with silica. Silicone rubber's characteristics include stability at high and low temperatures, no taste or smell, translucent and easy to colour, wide hardness range, weather resistance, and resistance to compression (Dow Corning, 2007).

2.8.5 Applications of Silicone Rubber Mold

Because silicon can be obtained in various forms, from liquid to solid, it allows engineers, inventors, and companies to use it as a key component in various industrial applications. Their versatile qualities also make silicone a critical ingredient in products that improve our lives, whether as rubber, liquid, resin, silicone gel, or silicone glue. Silicone can be applied in many different ways, from computer and spacecraft engineering and shampoo to baking molds. Silicon can also be used in renewable energy ranging from wind turbines to solar panels, but it also relies on silicon technology.

CHAPTER 3

METHODOLOGY

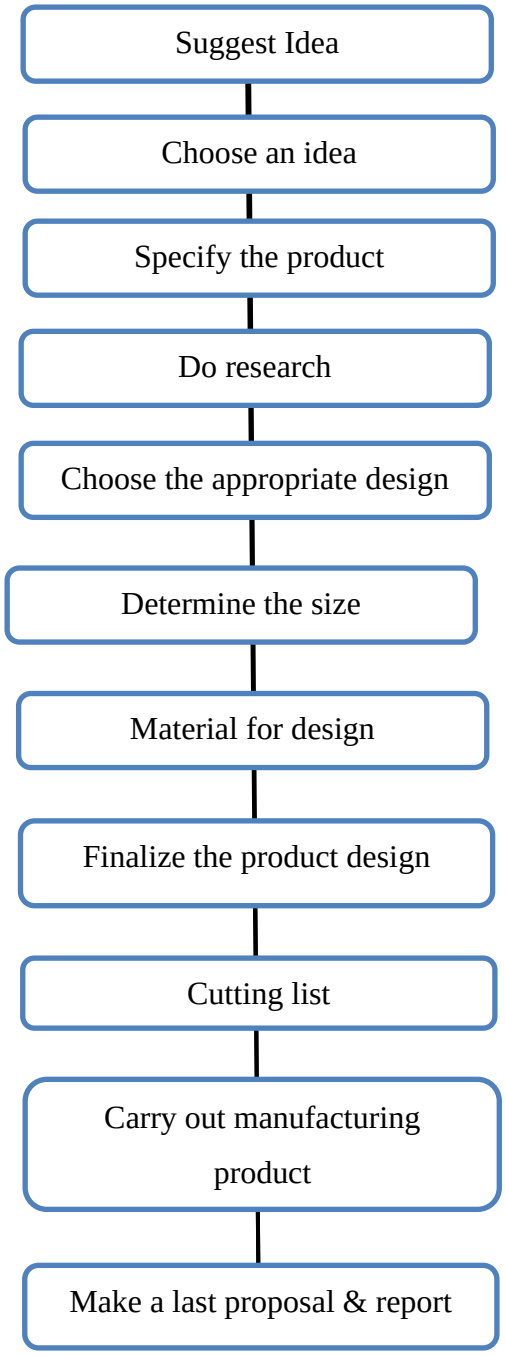
3.0 Research Development

At the beginning of our group study, we needed to study in advance the design and idea of our product release so that we could propose our product design sketch idea to be selected in one type of product and make sure that each design could work and be used well. For example, we design rostrums, dressing tables, keyboards, Braille, etc. However, among the discoveries of those ideas, we have chosen to produce a braille-type game product for visually impaired children. Game-type Braille is designed because it suits the nature of children at an early age who are fonder of playing. However, after choosing braille games as our product, we sketched various designs and games for our Braille. Therefore, we propose to create three game concepts in jawi. Our design was presented and approved by our supervisor Mr Abdul Razli B Abdul Rahim.

Next, we conducted an in-depth study of our braille game by searching for information on the internet related to Jawi letters. We also researched to find NGOs or schools that are more knowledgeable and experienced about disabled or blind people. Before we forget to mention Braille, we are focusing on the Jawi alphabet letters and fardu ain knowledge. Because of this, we must refer to those who are more knowledgeable or manage this matter. We contacted the NGO directly and finally got one of the NGO members from the Malaysian Islamic Visually Impaired Association (PERTIS) in Gombak. We have been in contact with Ms Nor Saliza, and she agreed to cooperate with us in giving his opinions and views about our braille game and focus; even she was also interested in the idea of our braille game that focuses on religion and welcomed us to her headquarters in Gombak. Also, our group is again improving in braille game design. Therefore, the views and opinions of some of the members of the NGO are very optimistic about our three types of braille games, namely the *Panduan Solat*, the *Panduan Wudu* and the *Rukun Islam & Iman*, and it also means that the production of our products can continue. Next, to further improve our product production, we plan to use a laptop sling & hand carry bag to store all braille games, which means that all three types of braille games are easy to carry anywhere and comfortable. Next, we made a cut list and estimated calculations for our basic Braille Panduan Fardu Ain. With almost everything ready, our group also created and prepared a report for our braille game.

Therefore, everyone from our group participated in preparing a research report on our braille game. Finally, in preparing a research report on our braille game. Finally, after researching and doing various studies related to our braille games, we found out a little about braille games for blind children. Next, our group will prepare a final report to our supervisor Mr Razli and then to the coordinator Mr Zullhyzrifee.

3.1 Flow chart



3.2 System Design and Development of Braille Educational Toys

System Design For our Braille Toys, we created designs inspired by other toys on the market, such as puzzles. In addition, we got an idea about the layout of the prayer guide poster design for children. We want to make it portable and easy to carry, whether for use by teachers at school or parents. Many other toys on the market only offer one type of game, either numbers or alphabets. We want to collect all the educational toys in one box or portable case to make it easier and more convenient for people who use them. Our Fardu Ain Braille Guide design is three board games in one laptop case. We include the board games Prayer Guide, Wudu Guide and Pillars of Faith & Islam Guide.

3.3 Design process

3.3.1 Source of ideas.

We get ideas, through research and design question guide poster design

Figure 17: *Poster Panduan Solat*

3.3.2 Product sketch

Create product sketches with 2D drawings.

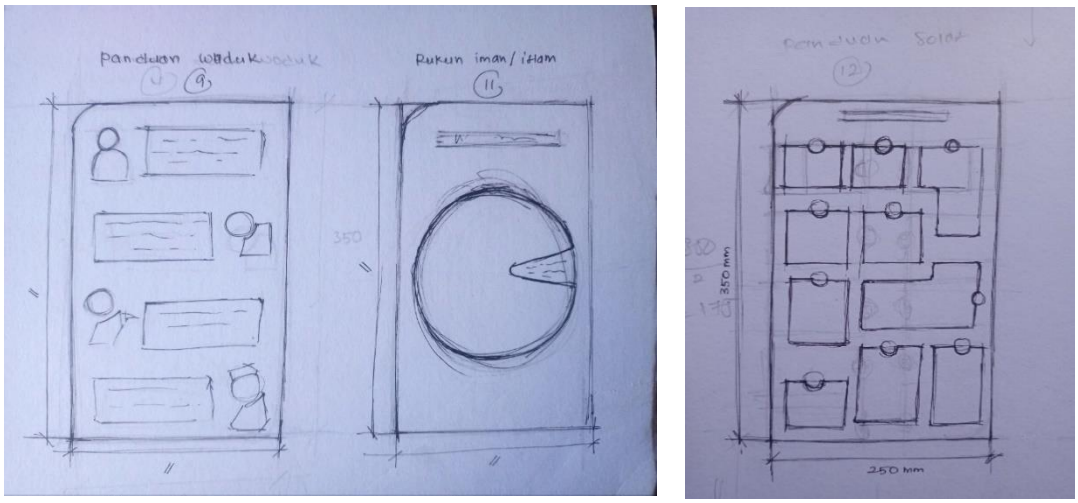


Figure 18: Product sketch

3.3.3 Technical Drawing

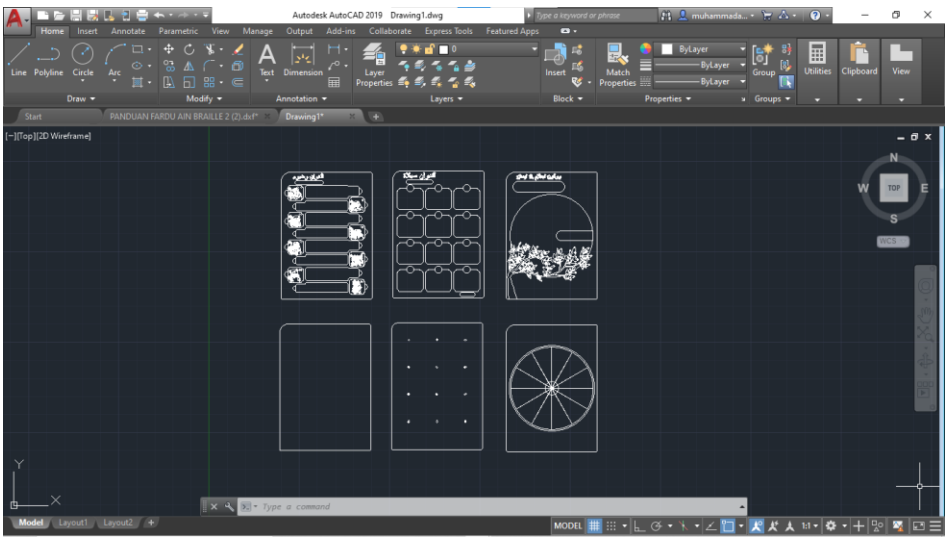


Figure 19: Plan side from AutoCAD

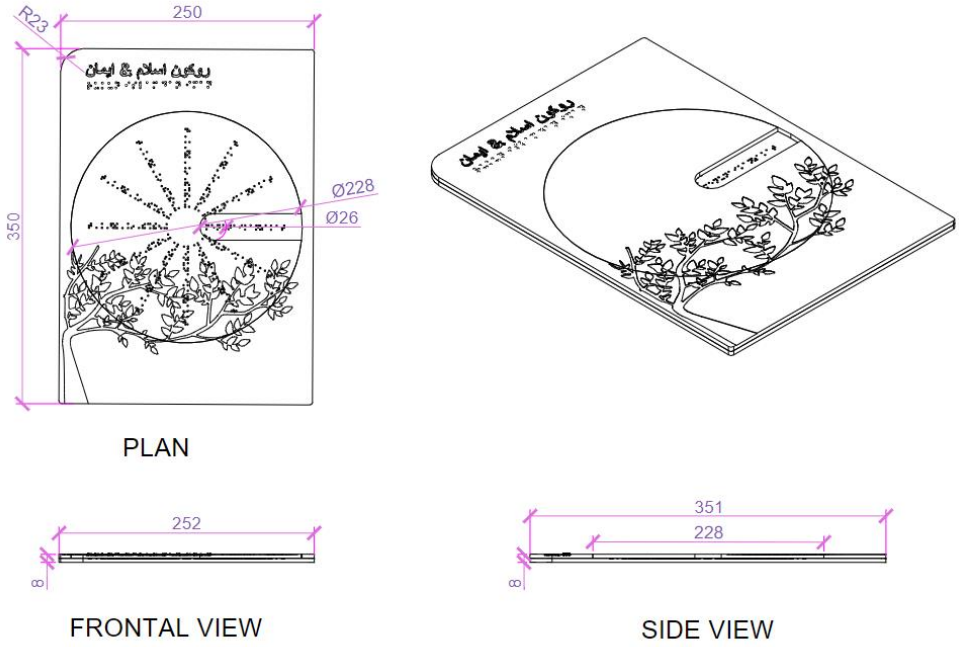


Figure 20: Orthographic view with dimension *Rukun Iman dan Islam*

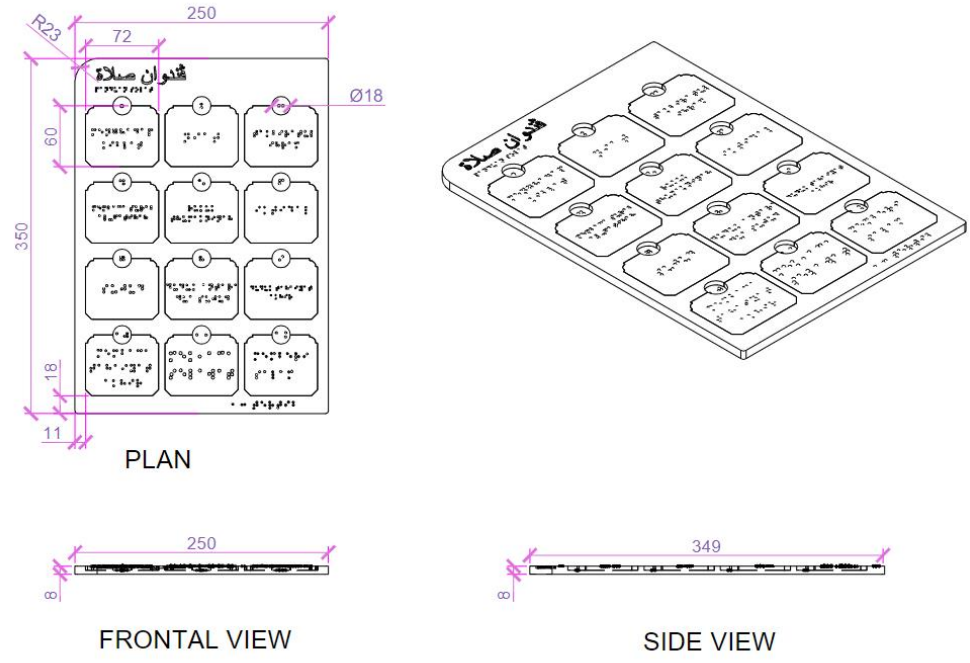


Figure 21: Orthographic view with dimension *Panduan Solat*

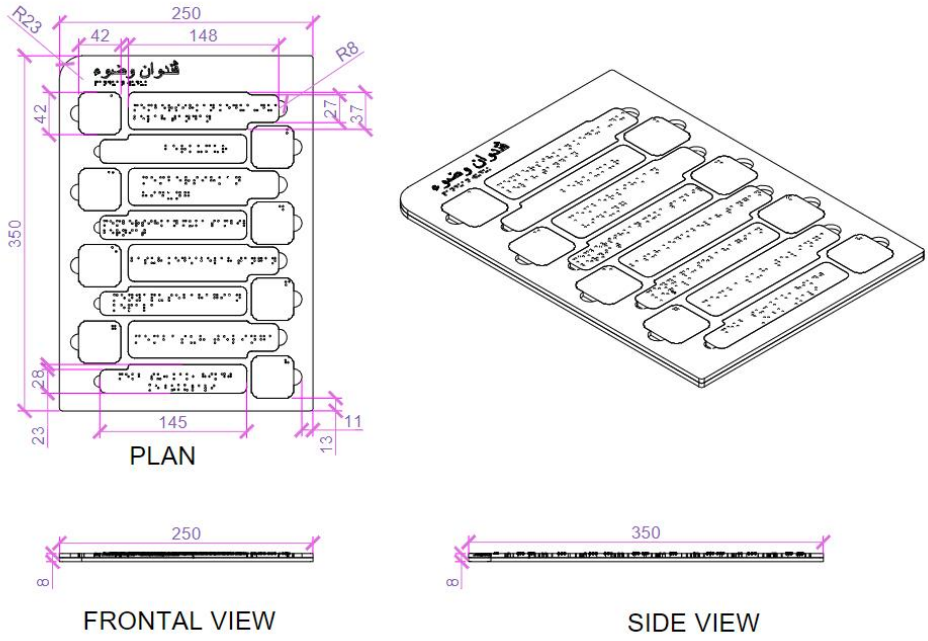


Figure 22*:* Orthographic view with dimension *Panduan Wuduk*

3.3.4 Isometric view with rendered

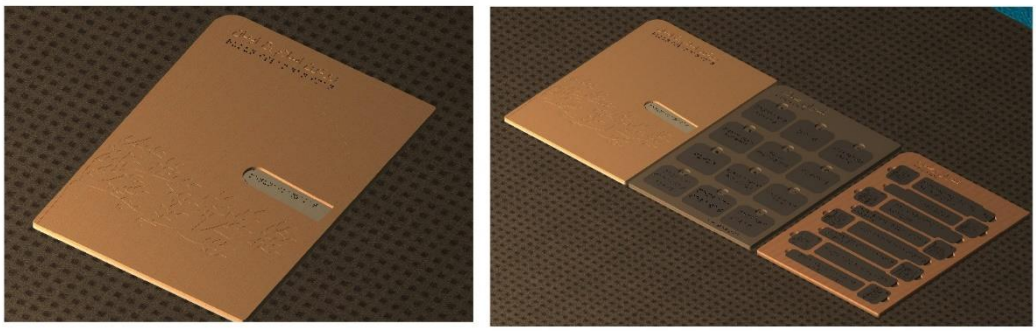


Figure 23*:* Isometric view *Rukun Iman dan Islam* with rendered

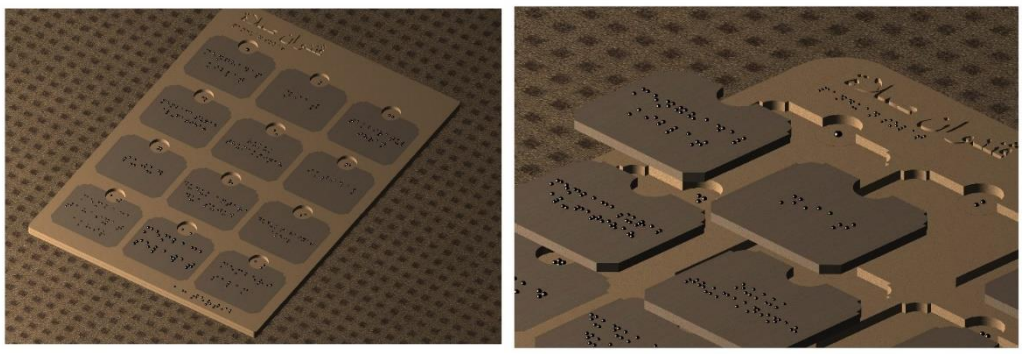


Figure 24*:* Isometric view *Panduan Solat* with rendered

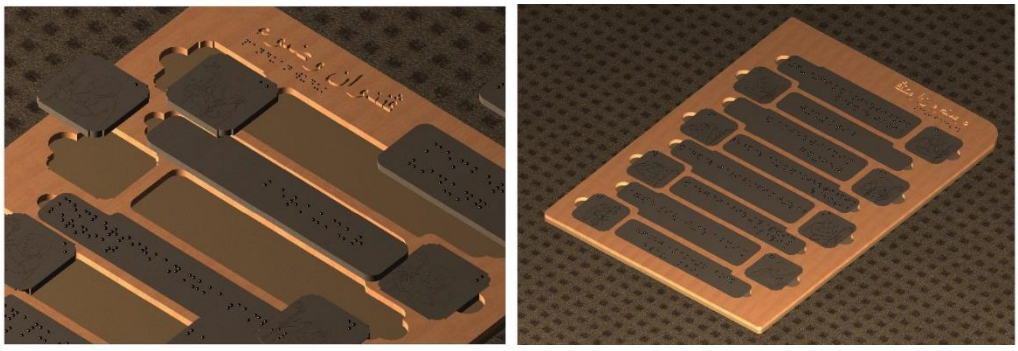


Figure 25*:* Isometric view *Panduan Wuduk* with rendered

3.4 Research Site/Interview Office

The term Research Site is on-site research that involves physically moving to a specific place to collect information related to the research project. It may consist of visits to institutional libraries or archives to collect information relevant to your research or visits to places involved in research projects to obtain first-hand information through interviews, records review and visual inspection.

Figure 26: The staircase goes up to the PERTIS office

Figure 27: In the office PERTIS, we got a help from Ustaz Kusyairi to type a Jawi Braille for hardcopy.

Figure 28: After a typed of jawi Braille from computer, we then were showed by Ms. Saliza how to print out a hardcopy braille on plastic paper using their machines

3.5 Purchase of Materials

For purchases, we make a bill of materials to facilitate the purchase process and be able to estimate the total cost that needs to be issued. With the passage of time that is growing with technology, we decided to buy some items through online purchases including Shopee and Lazada. This is because, we can save time and transportation costs. However, there are some materials that we cannot buy online such as plywood. We are just looking for a nearby store by looking for information on the internet and also meeting with lecturers. With the available information we can go and return the necessary materials.

NO	BAHAN	SAIZ	KUANTITI (PCS)	HARGA (RM) / UNIT	JUMLAH HARGA (RM)
1	Plywood	8ft x 4ft x 3mm	1	53	53
2	Plywood	8ft x 4ft x 5mm	1	36	36
3	Ball Bearing	2mm	300	0.04	11.08
4	Gam 3 Second	20g	6	1.99	11.94
5	Spray Clear	400ml	3	10	30
6	Magnet	4mm x 2mm	240	0.28	67.20
7	Premium Wood Glue	473ml	1	23.31	23.31
8	Epoxy Resin Clear	1kg	3	26.90	80.70
9	Silicone Rubber Mould Liquid	500g	3	60	180
10	Colour Pearl Pigment Mica Powder Epoxy	10g	3	1.88	5.64
11	Embosser Braille Paper	210mm x 297mm	28	1	28
12	Hand Carry Bag	40cm x 30cm x 6cm	4	21.99	87.96
13	Name Embroidery On The Bag	-	4	15	60
14	Cost Laser Cutting & Engraving Machine	396 minit	-	2	792
					RM 1 466.83

Price For 1 Set Panduan Braille Fardu Ain = RM 366.71

3.5.1 We went to B.S. HUAT in Sungai Buloh to buy laminated plywood and we also went to Chin Chun Hardware in Subang to buy 5mm plywood.

Figure 29: Picture from B.S. HUAT in Sungai Buloh

Figure 30: Selection Of Type And Size Thickness Of Laminated Plywood

Figure 31: Measurement And Cutting Process

Figure 32: Picture from Chin Chun in Subang

Figure 33: Selection Of Type And Size Thickness Of Laminated Plywood

Figure 34: Measurement And Cutting Process

3.5.2 Purchase Of Materials Online

Figure 35: Purchase Of Liquid Silicone Rubber And Magnet (2mm)

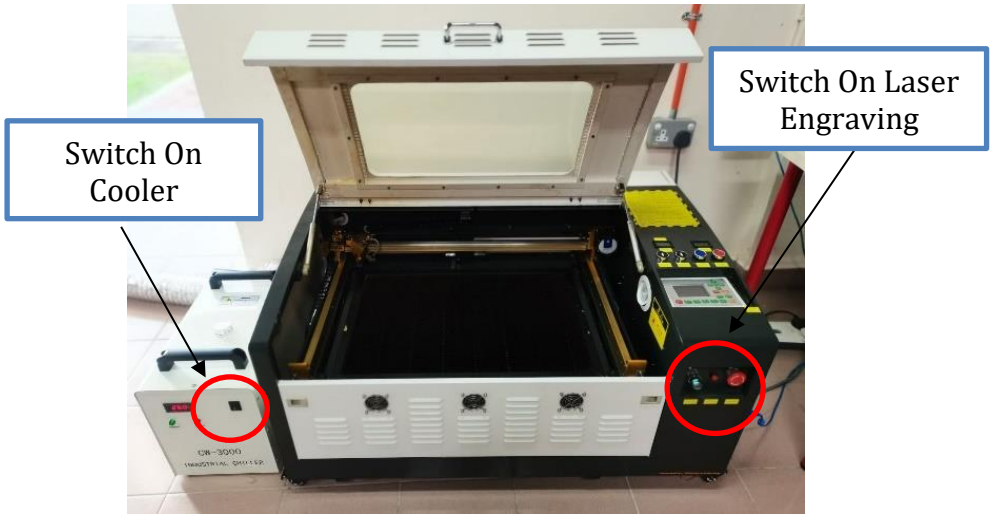
Figure 36: Purchase Of Bags And Ball Bearings

3.6 Laser Engraving and Cutting

The use of laser engraving and cutting in our project is almost 97% to complete the cutting and engraving. The result of the finishing is very satisfied and the use of this laser engraving and cutting machine is also easy to operate and safe compared to others cutting machines.

The disadvantages of the machine here that is has set a large size and the maximum thickness used that is wood cannot be more than 700cm x 250cm and the thickness cannot be more than 5mm. This size factor is important because it will interfere with the finish on the product that we want to laser because the operation of the machine is to use a program that has been prepared or in accordance with the laser engraving and cutting machine. The program used for the machines in the Polytechnic is RD Works where RD Works is a free program that allows you to carry out laser cutting and engraving processes with ease. RD Works is a design and drawing program which supports drawing points, horizontal and vertical lines, polyline, ellipse and circle, rectangular and square, Bezier curve, text, and formats for CAD models such as DXF, AI and PLT. Steps to use laser engraving and cutting:

1) Switch on the machines and also the laser engraving and cutting cooler switch. Cooler is for cooling the laser engraving and cutting machine because the machine uses very high heat.



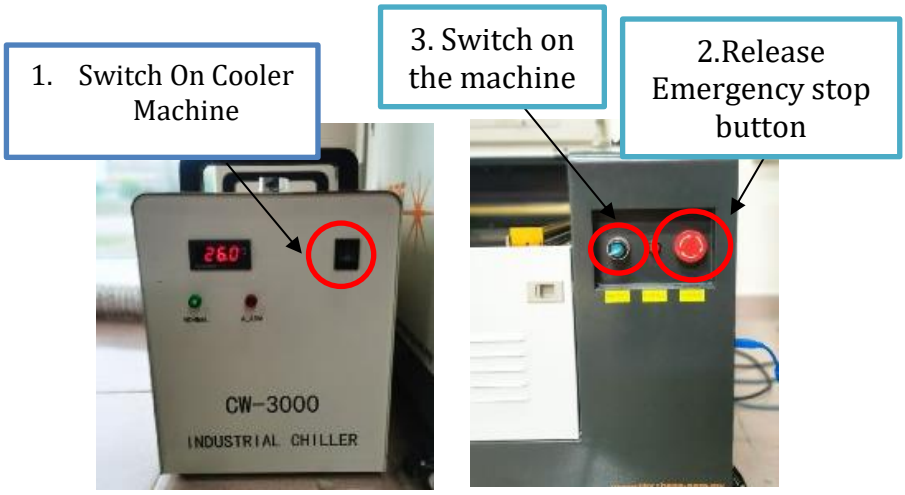


Figure 37: Cooler Machine and switch button machine

2) Take a plywood and place it on the work table to measure the height of the laser eye using the tool provided. Between the laser eye distance and the stick must be measured correctly and accurately so that the setting is easy to set on the RD Works program later.

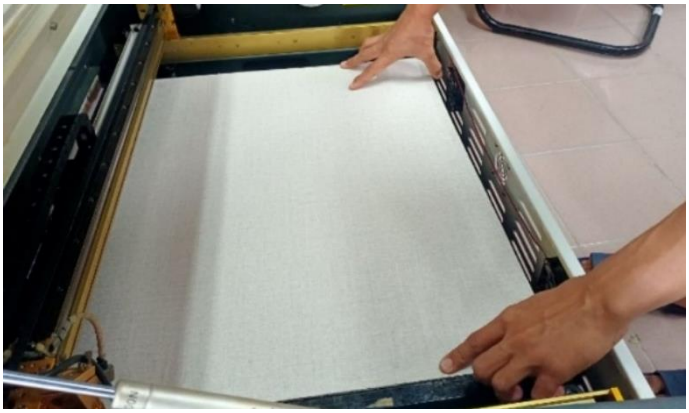


Figure 38: Place the board on the top of machine

3) Convert CAD (DWG file) to a file compatible with the program such as DXF.

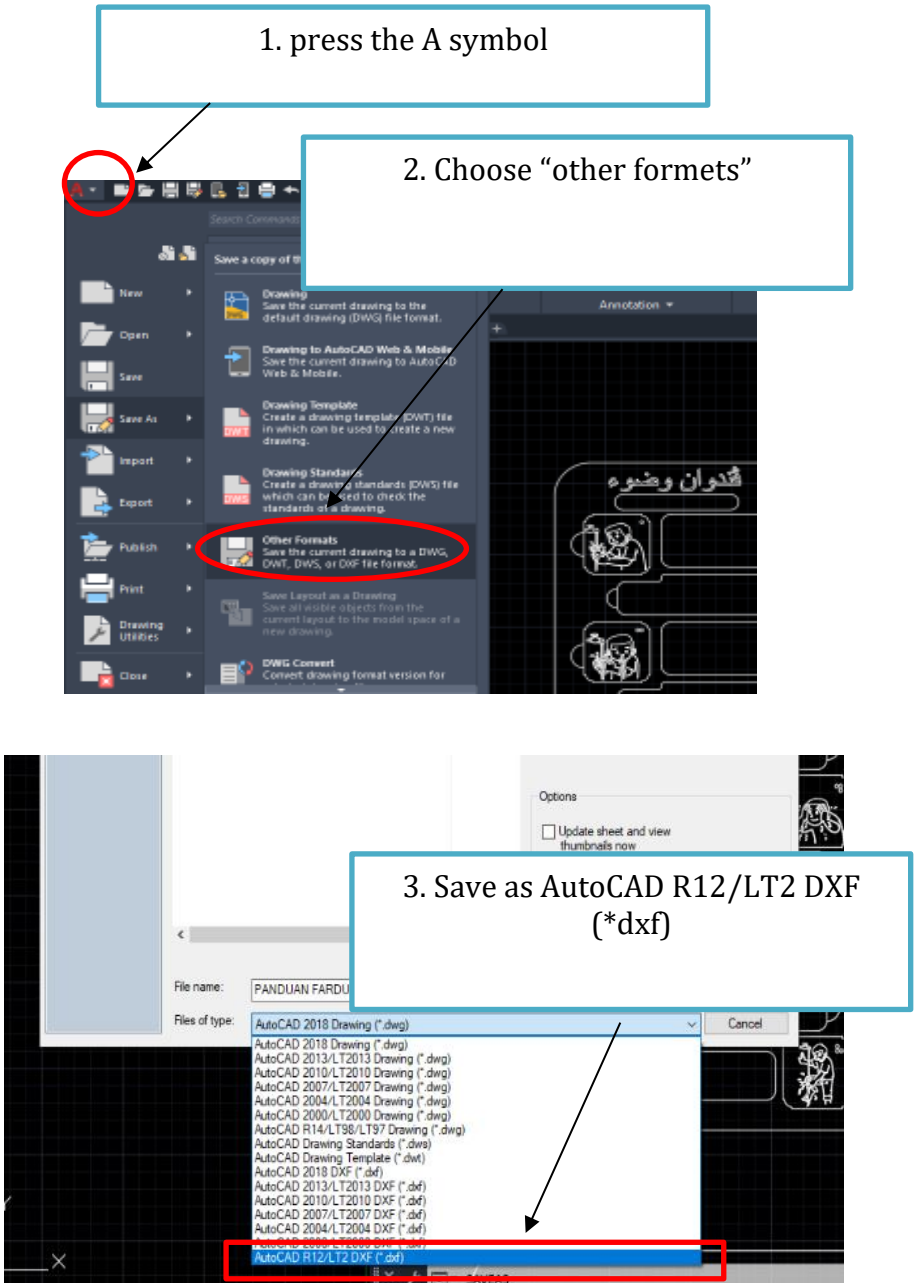
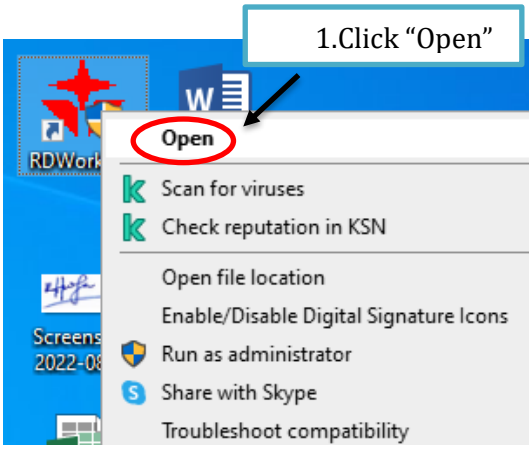


Figure 39: Save DWG file to DXF file

4) Next, open the RD Works program on the laptop or computer and connect the laser engraving and cutting machine USB (Universal Serial Bus) wire to the laptop or computer. Then press "FILE" in the upper left corner. Select "IMPORT" and open the drawing file that has been saved earlier.



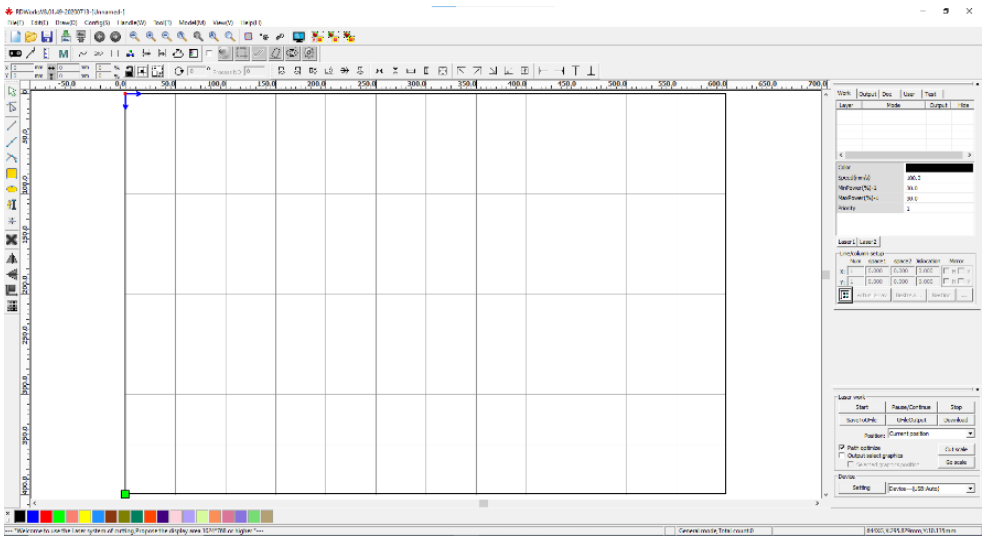


Figure 40: Views in RD Works

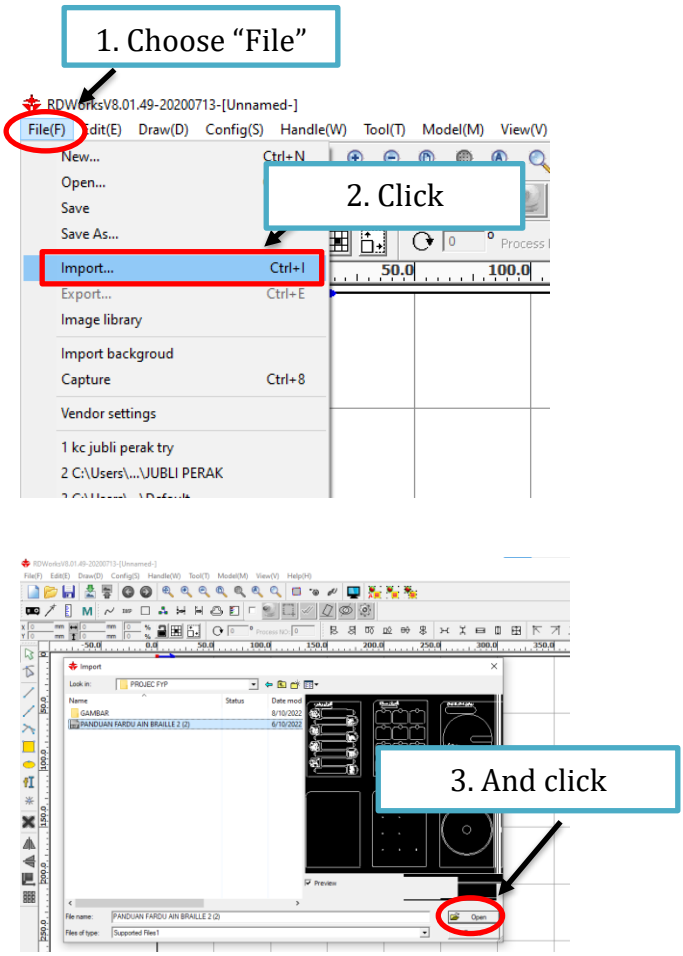


Figure 41: Choose the file

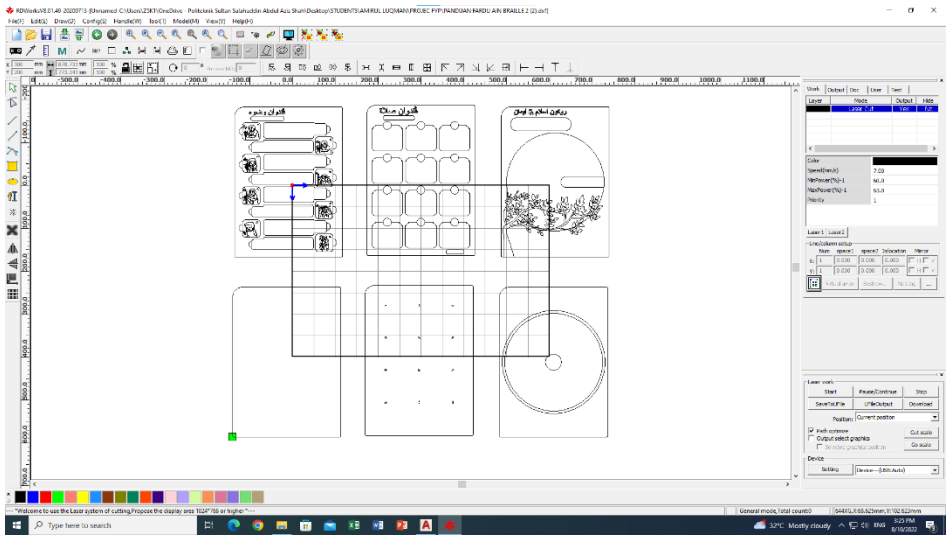


Figure 42: Once the drawings are entered, select a set of drawings to print

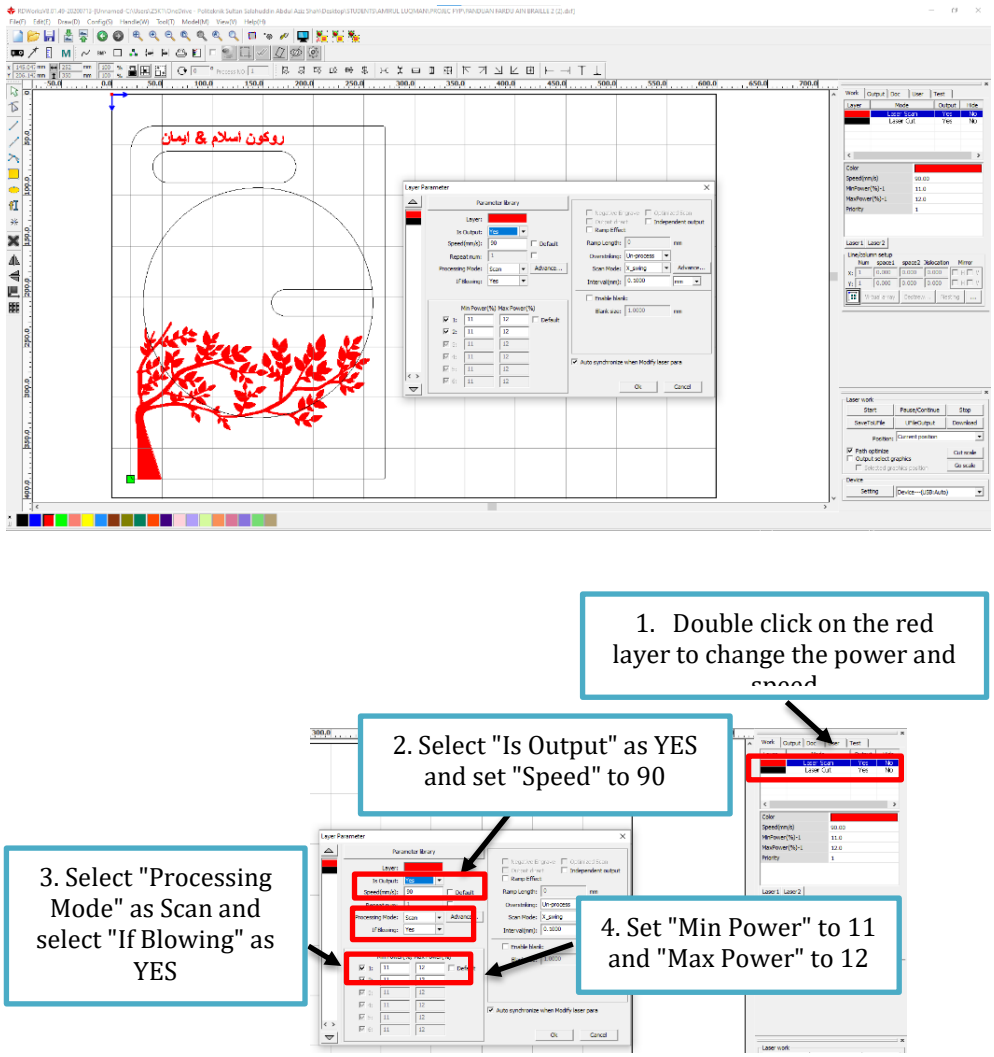
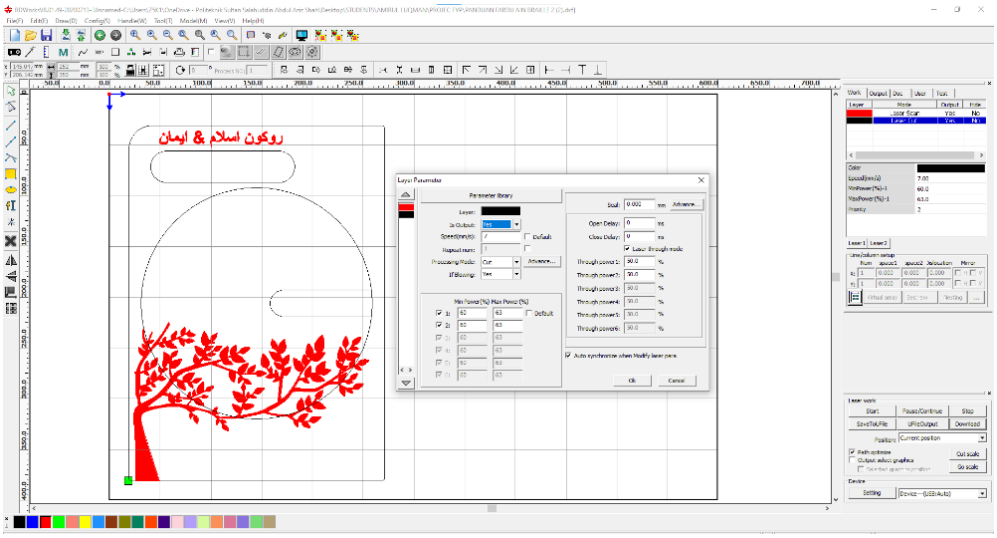


Figure 43: Select the part to cut and scan



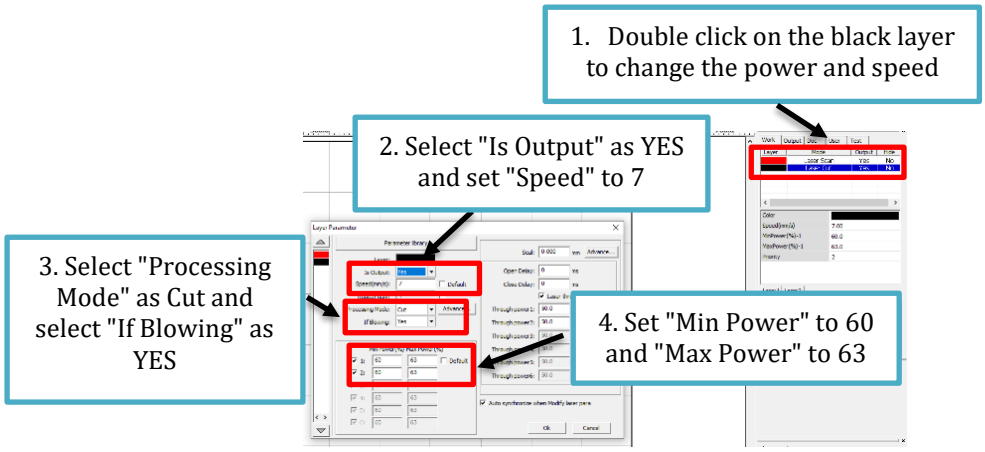


Figure 44: Select the part to cut and scan

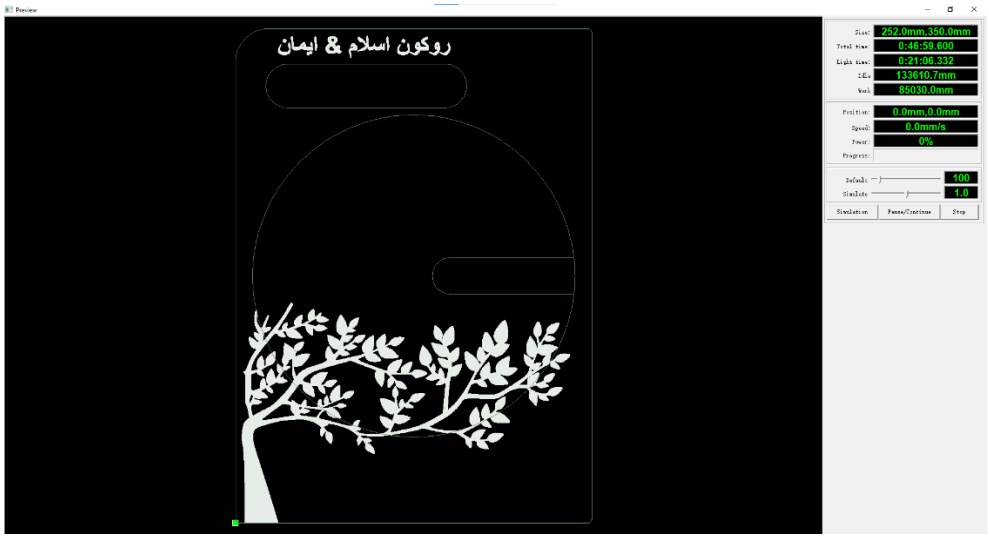


Figure 45: Check process before the machine is operated

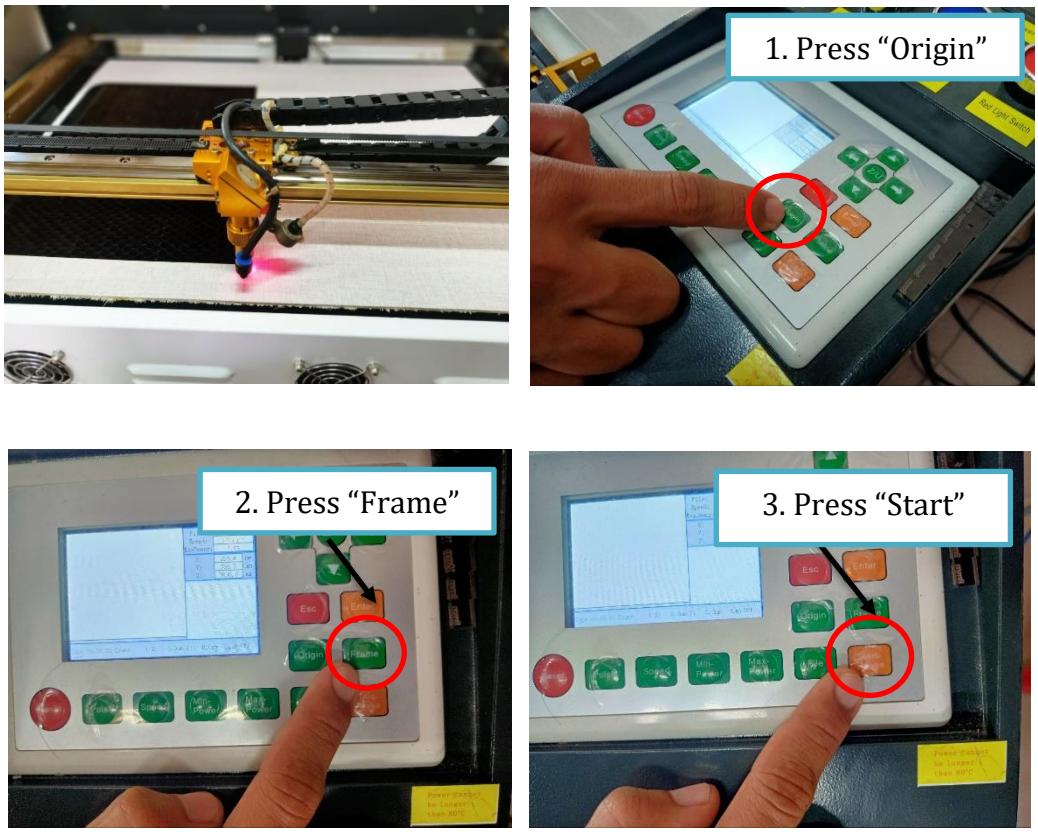
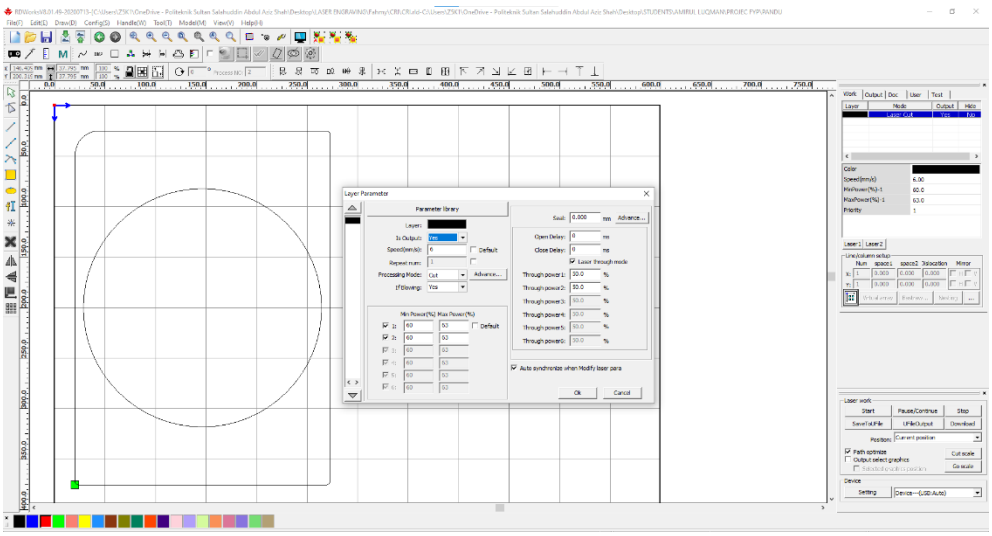


Figure 46: Test the size of the model on the machine through a sketch that has been made on the computer

Figure 47: Result



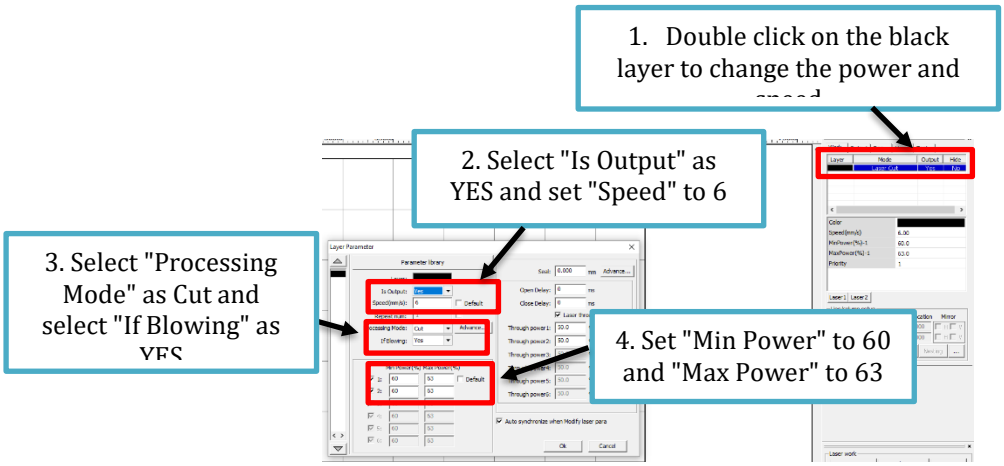


Figure 48: Select the part to cut

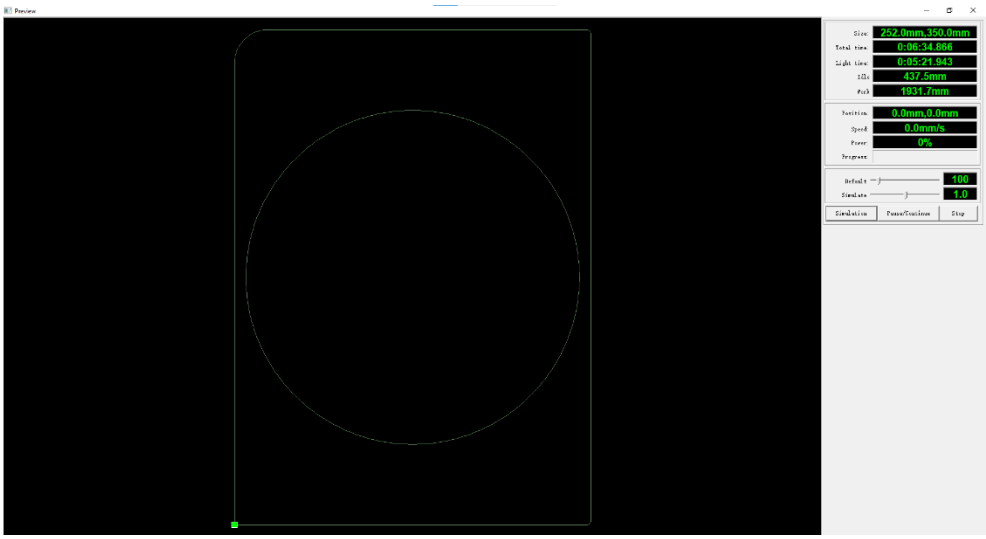


Figure 49: Check process before the machine is operated

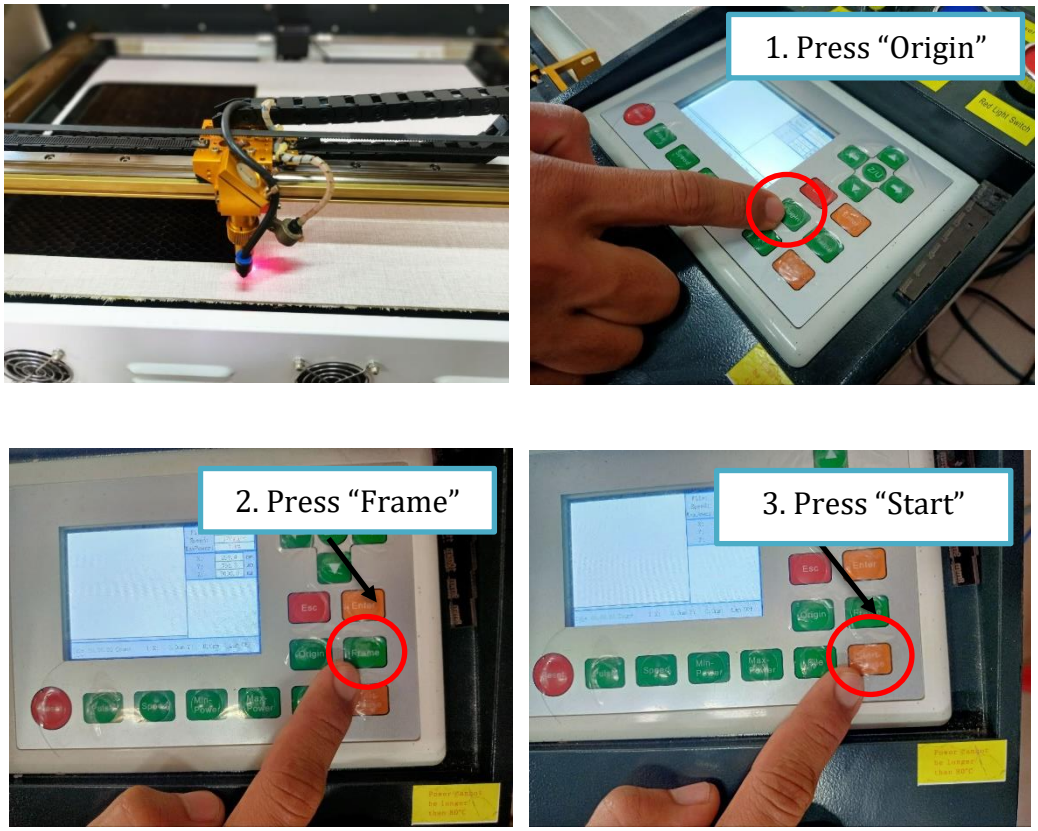


Figure 50: Test the size of the model on the machine through a sketch that has been made on the computer

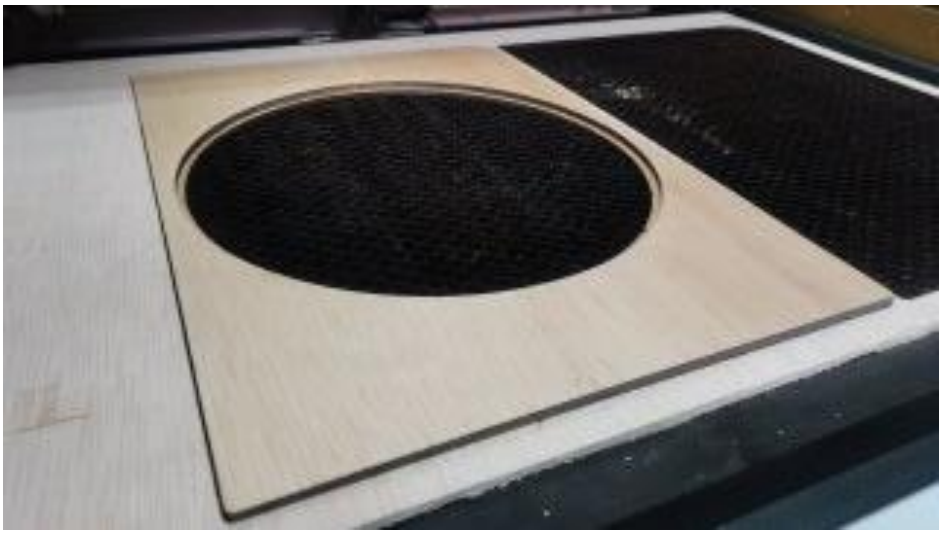


Figure 51: Result

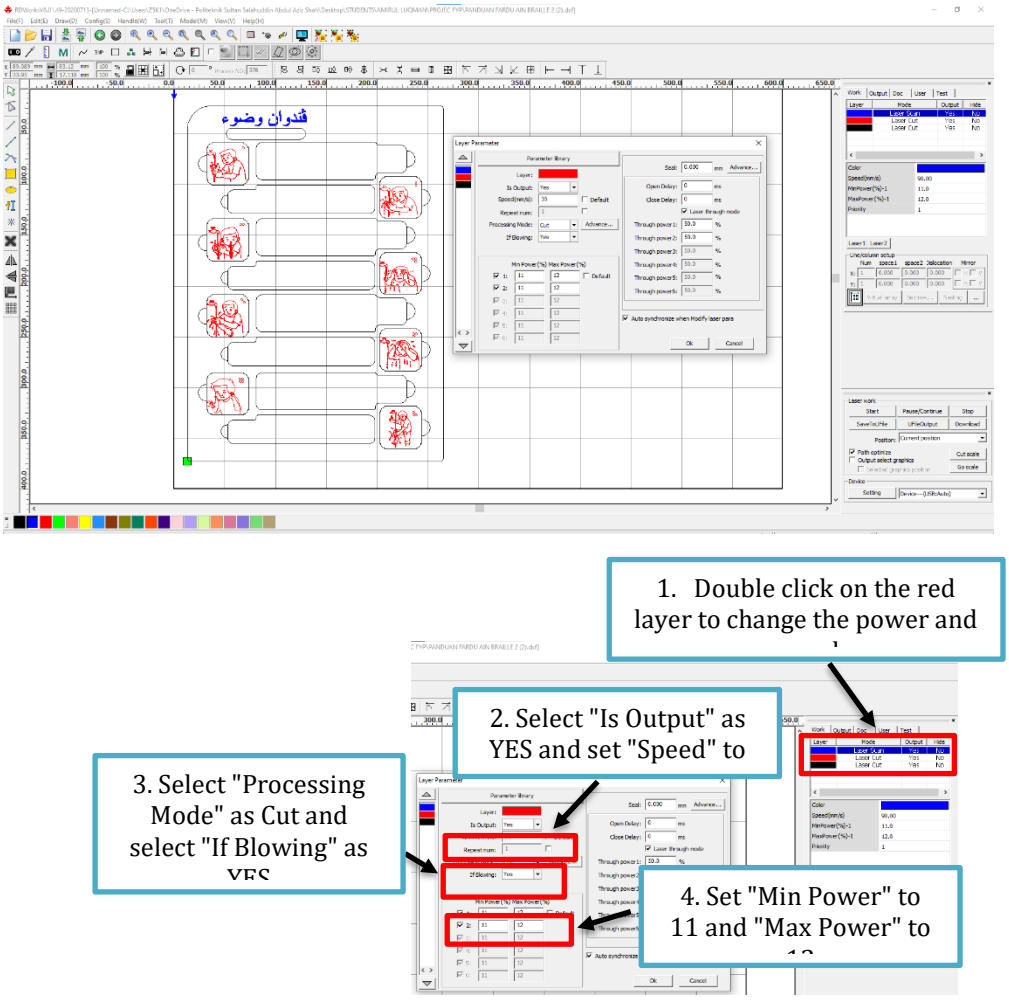
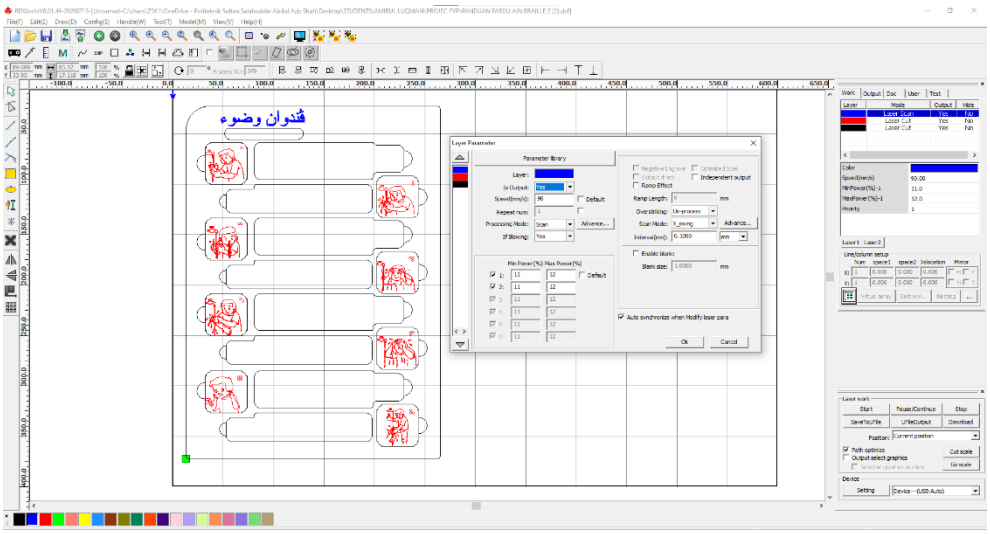


Figure 52: Select the part to cut and scan



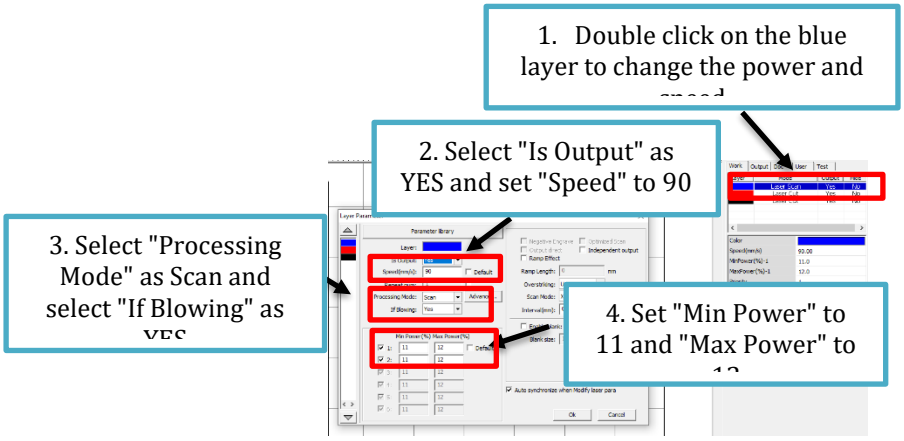
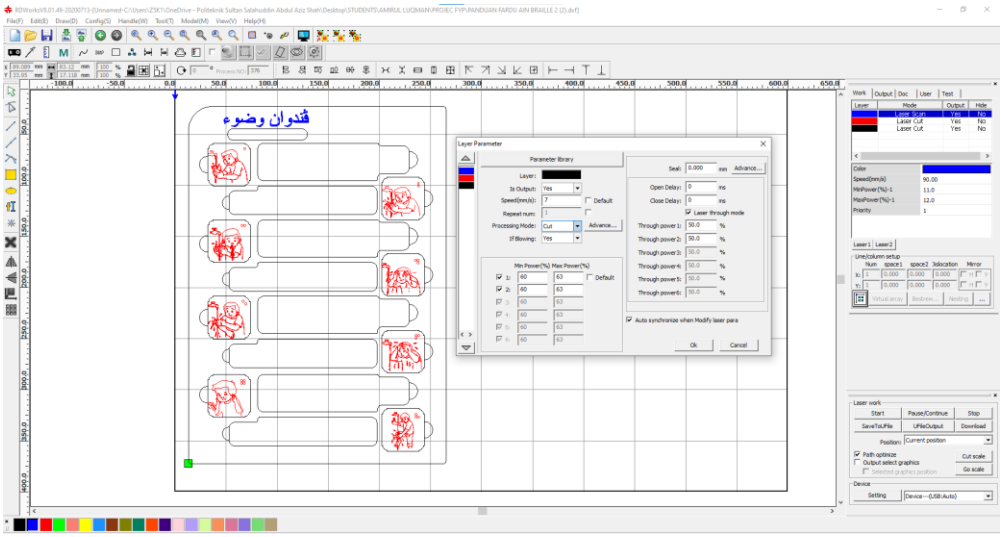


Figure 53: Select the part to cut and scan



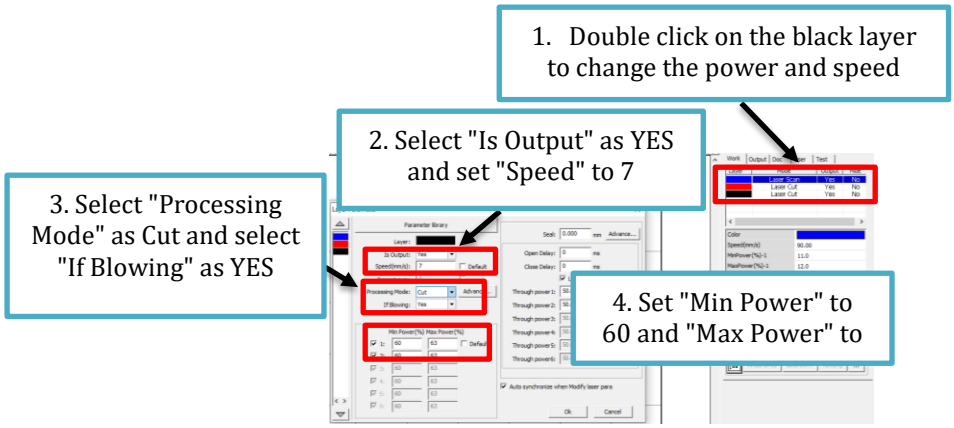


Figure 54: Select the part to cut and scan

Figure 55: Check process before the machine is operated

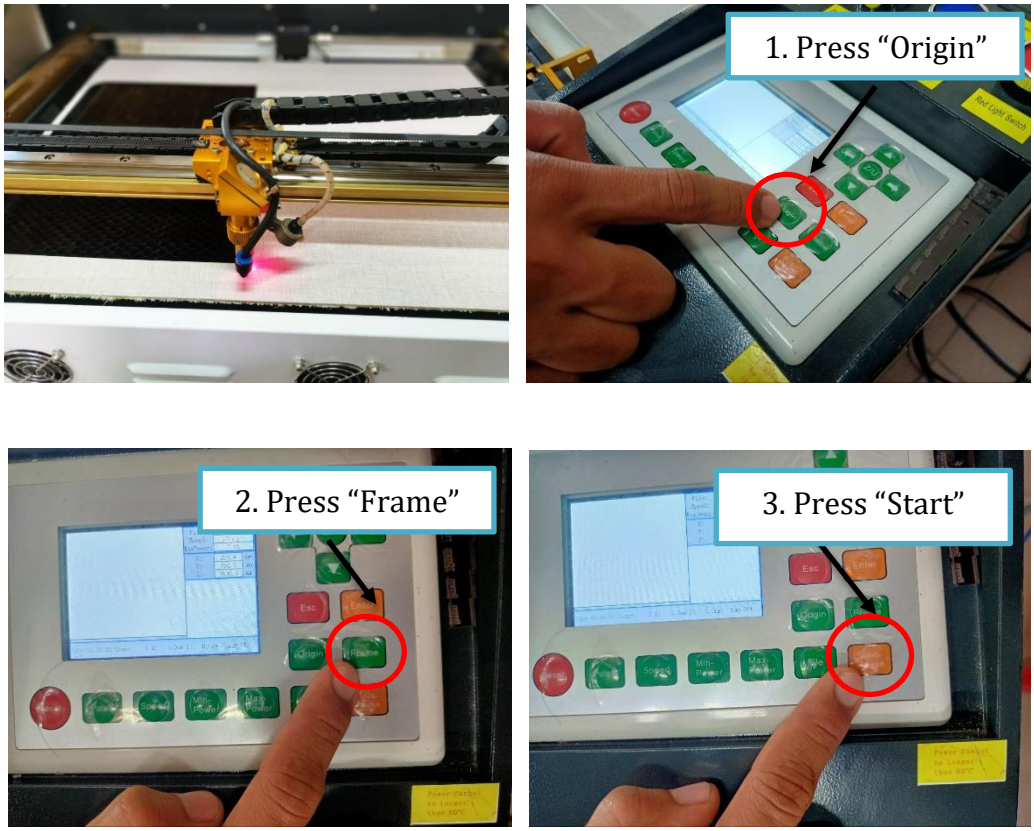


Figure 56: Test the size of the model on the machine through a sketch that has been made on the computer

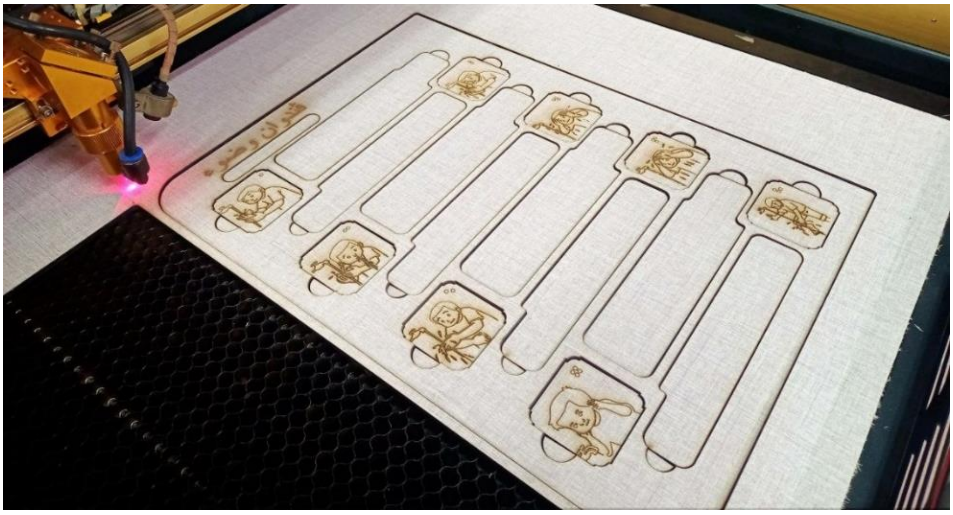


Figure 57: Result

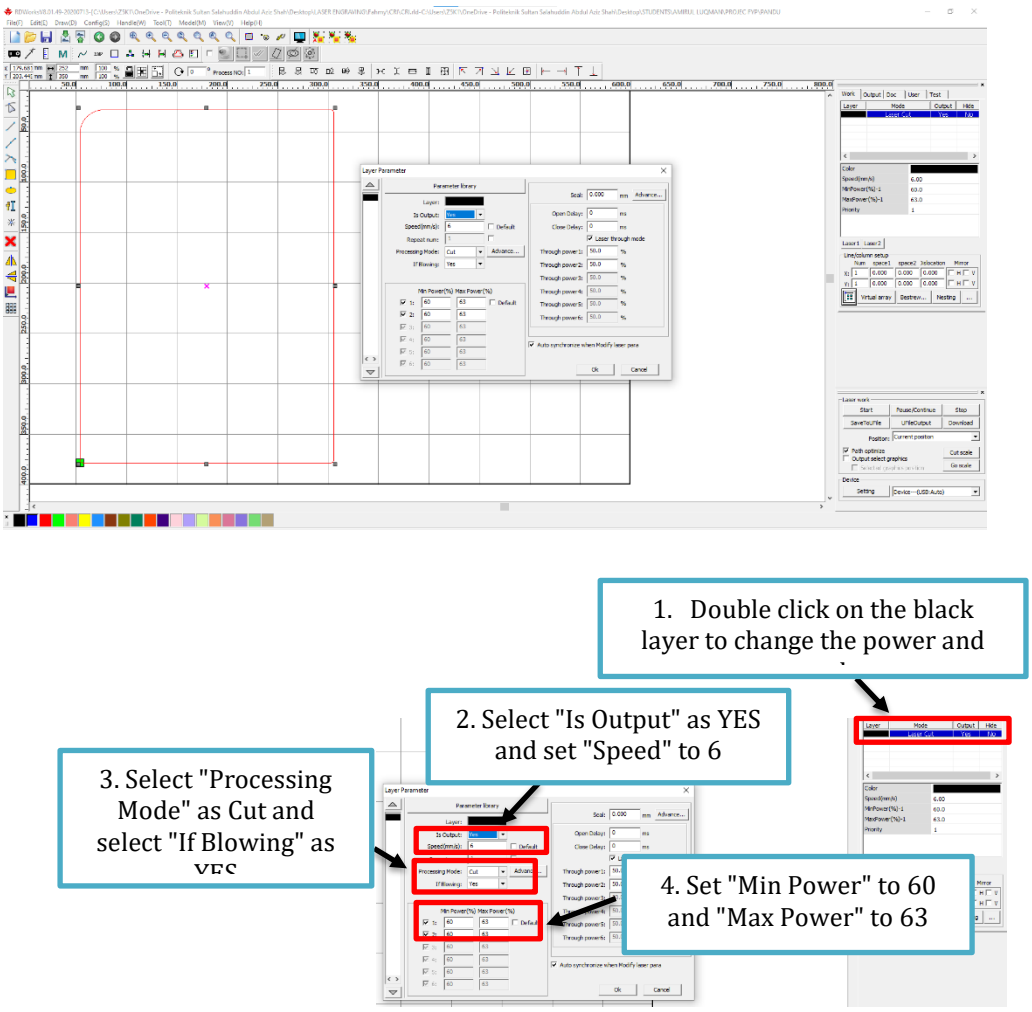


Figure 58: Select the part to cut and scan

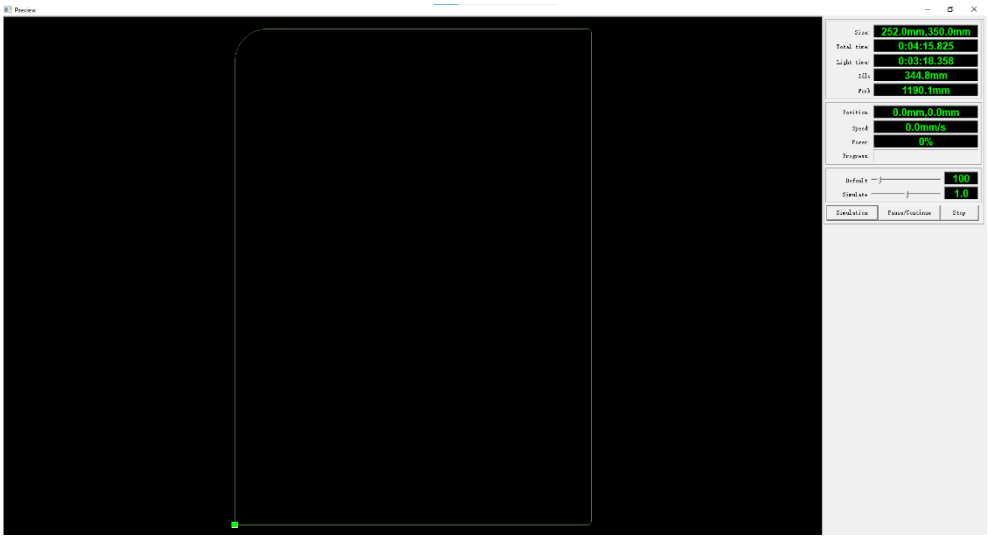


Figure 59: Check process before the machine is operated

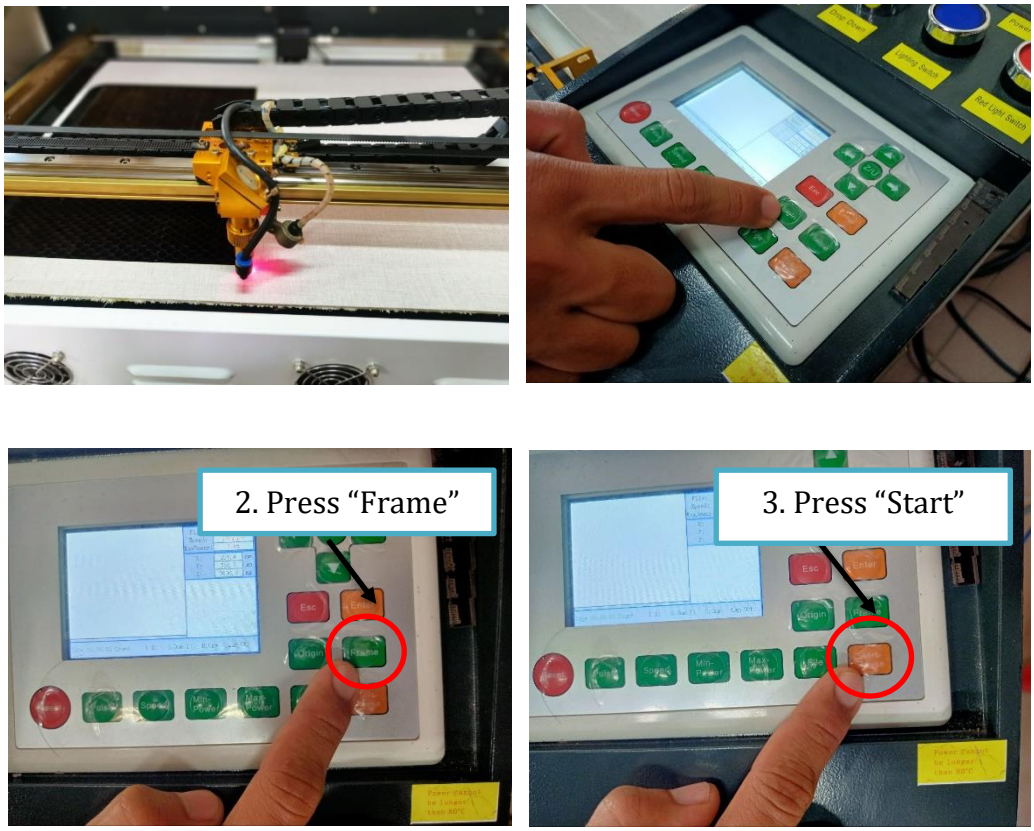


Figure 60: Test the size of the model on the machine through a sketch that has been made on the computer

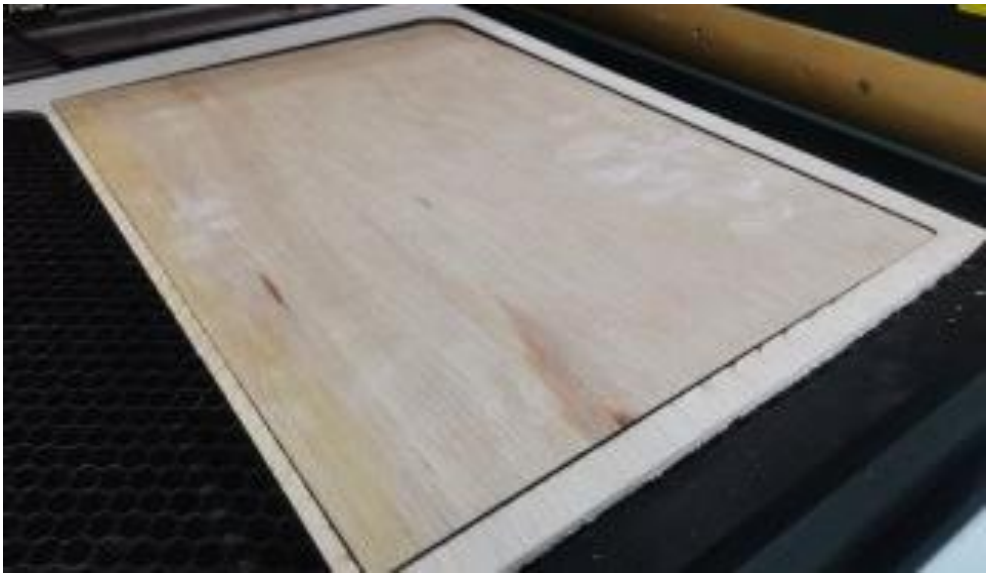


Figure 61: Result

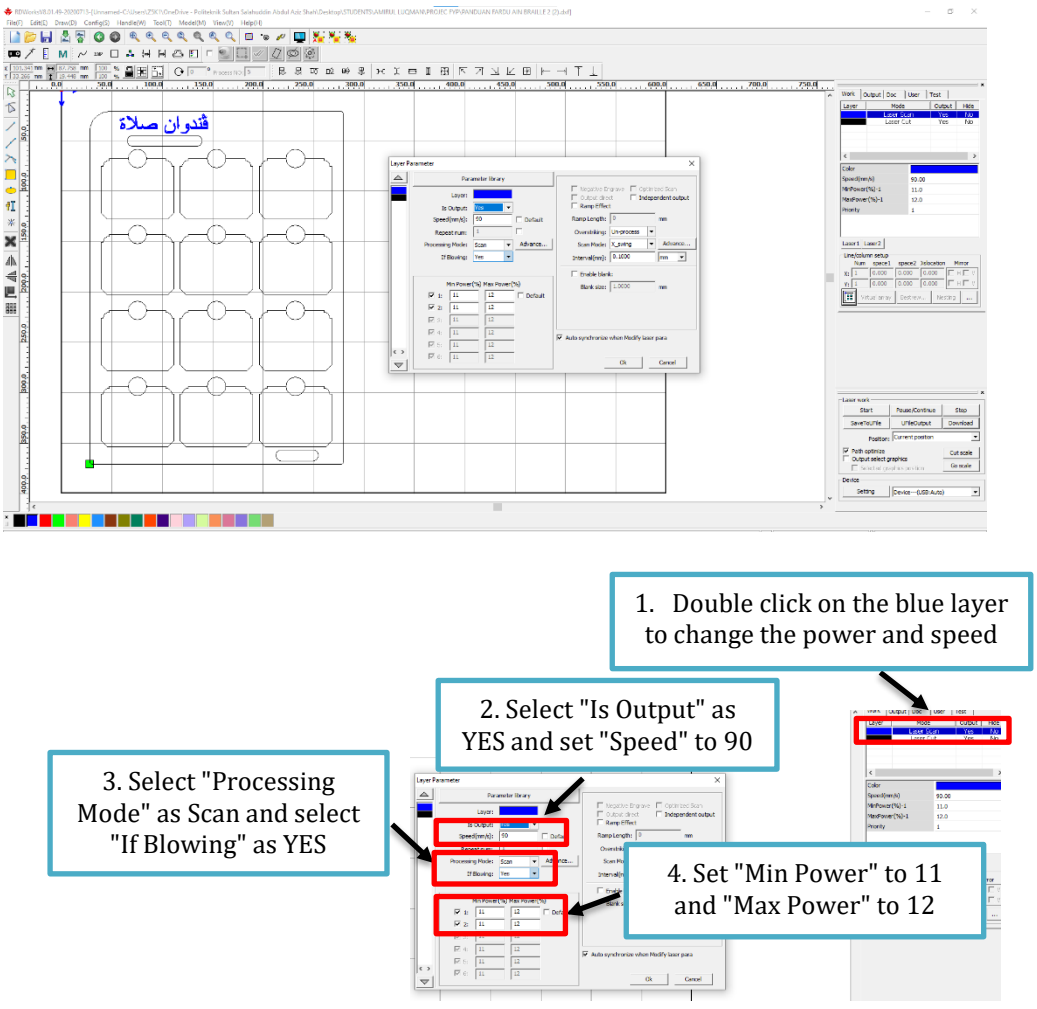
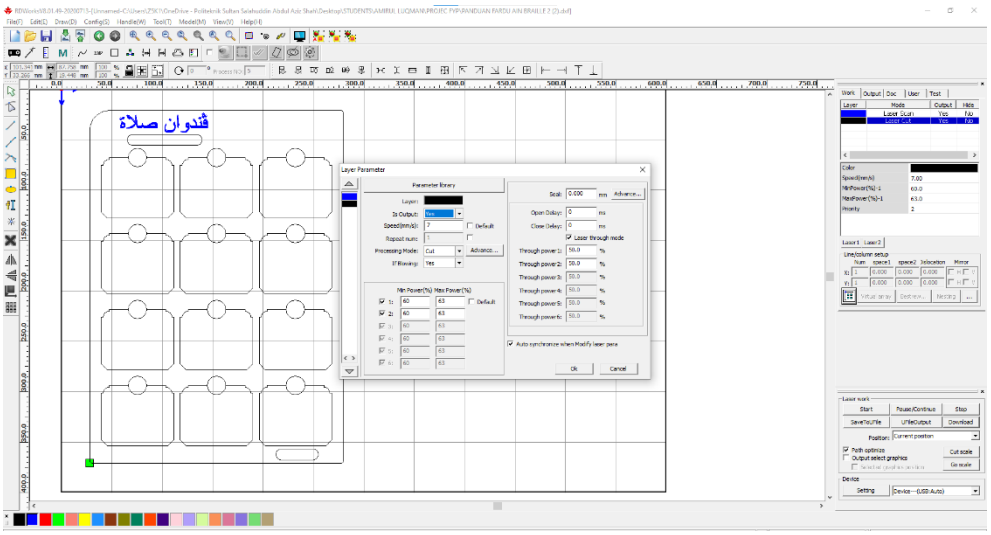


Figure 62: Select the part to cut and scan



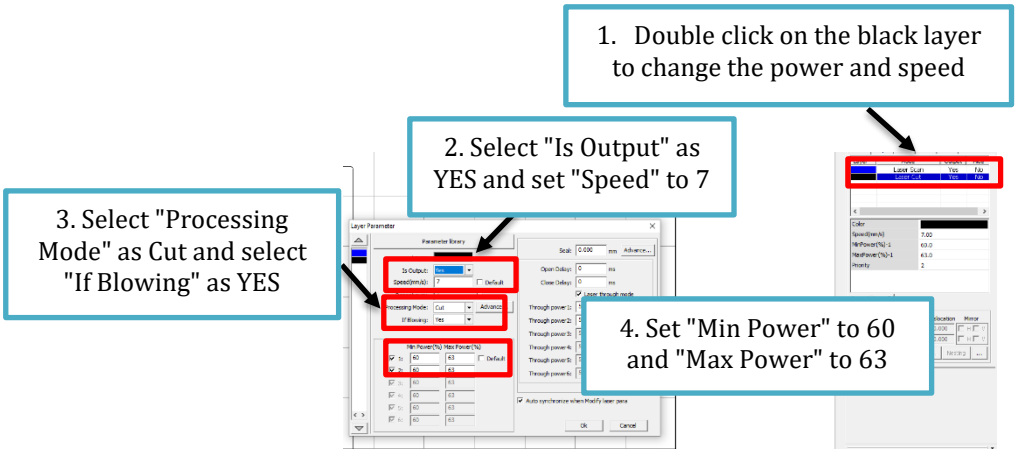


Figure 63: Select the part to cut and scan

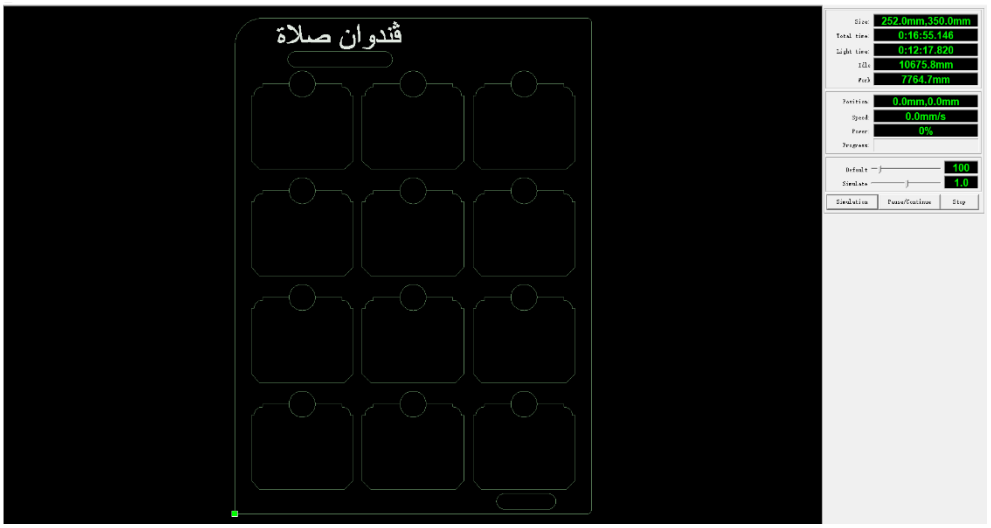


Figure 64: Check process before the machine is operated

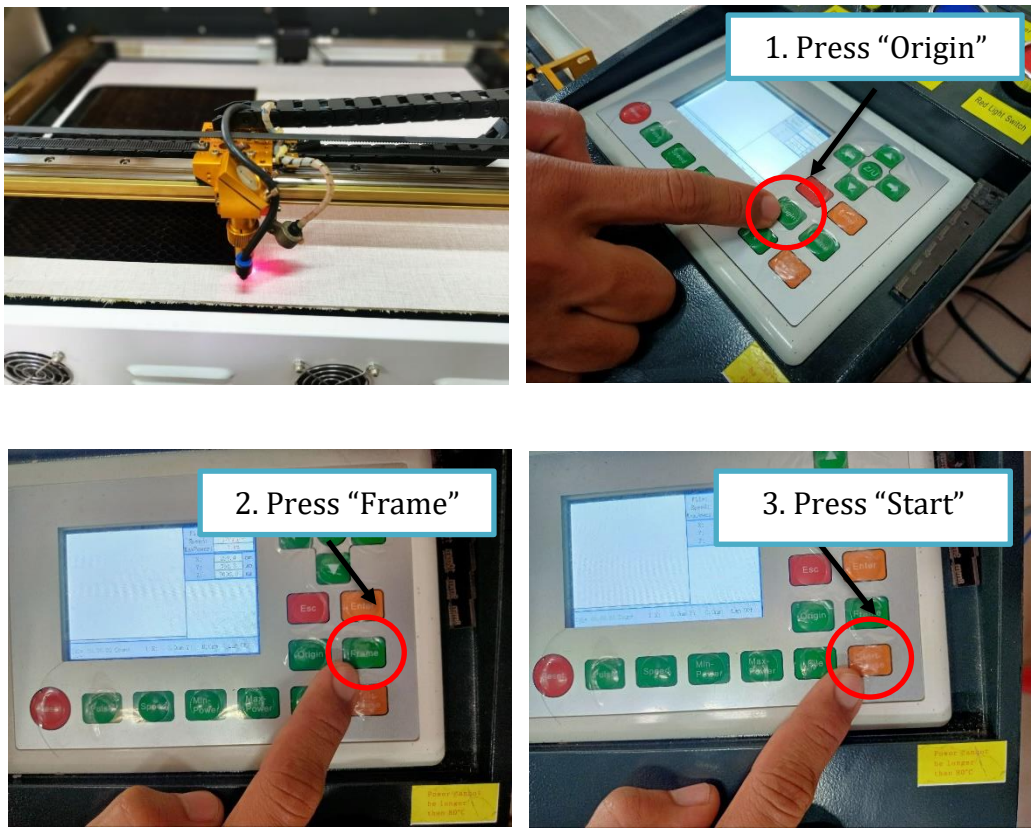


Figure 65: Test the size of the model on the machine through a sketch that has been made on the computer

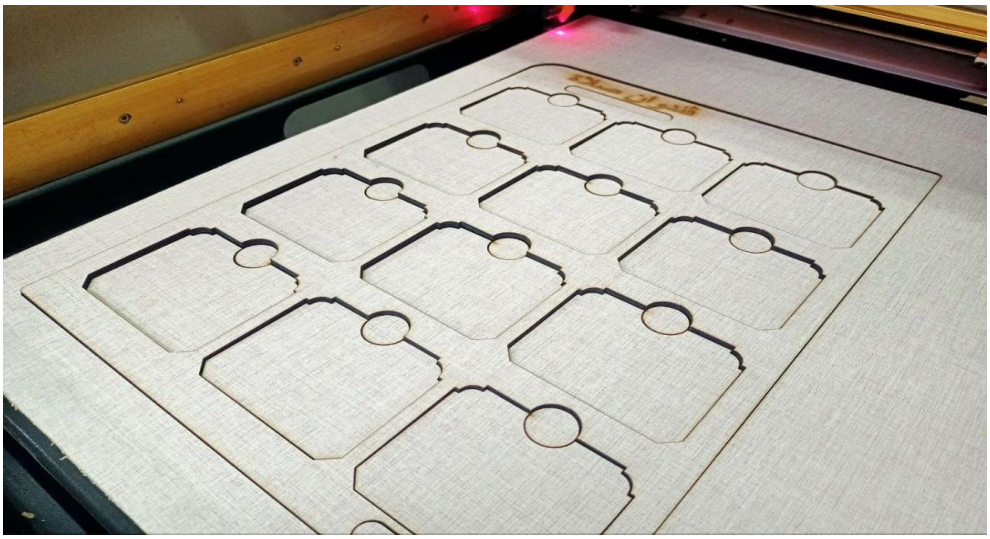


Figure 66: Result

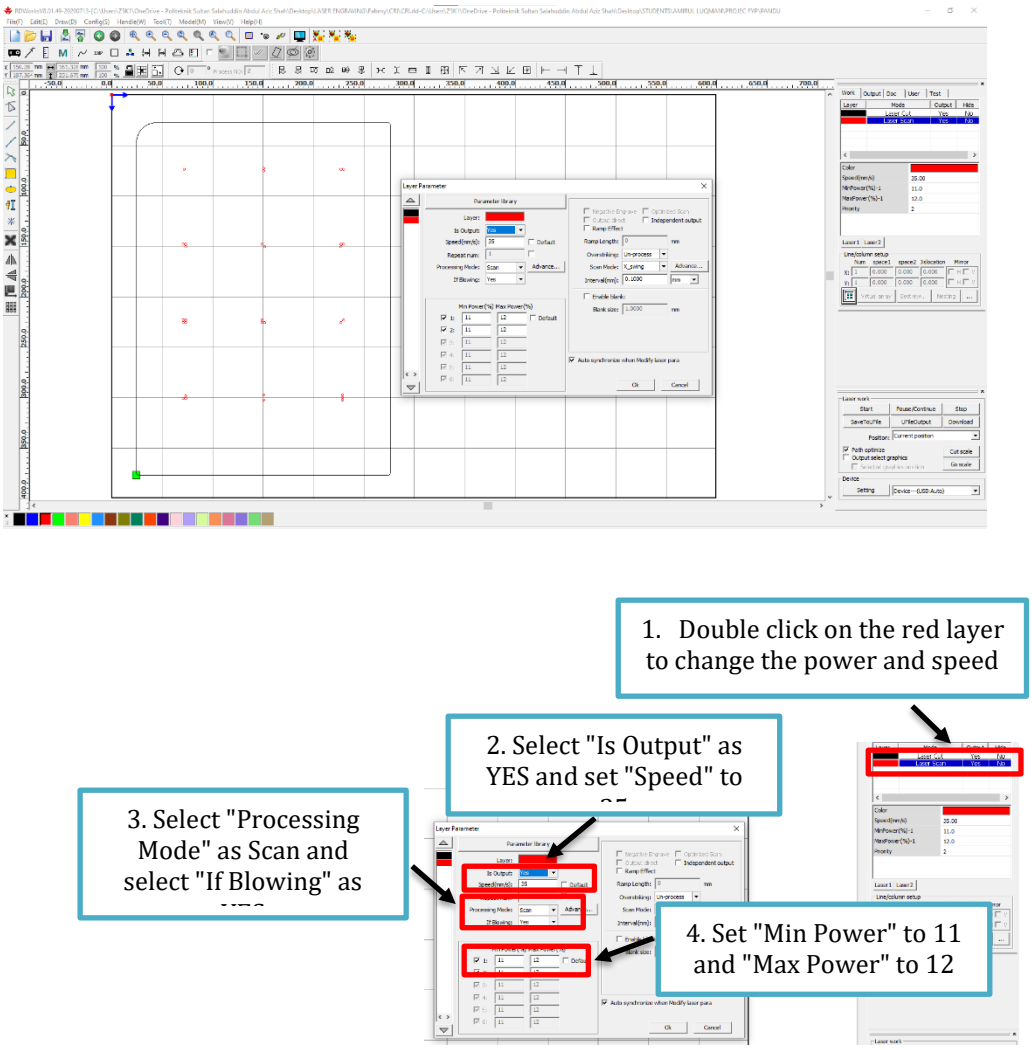
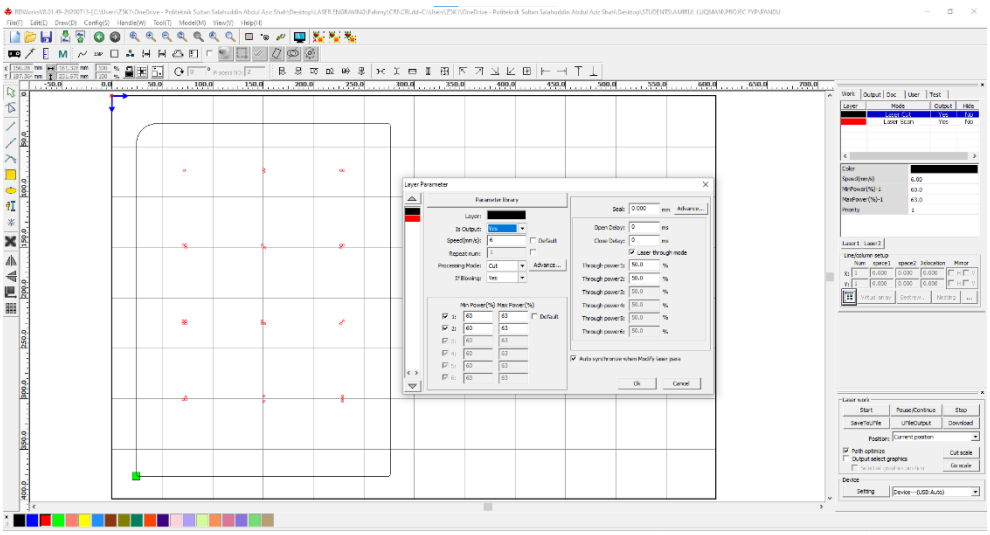


Figure 67: Select the part to cut and scan



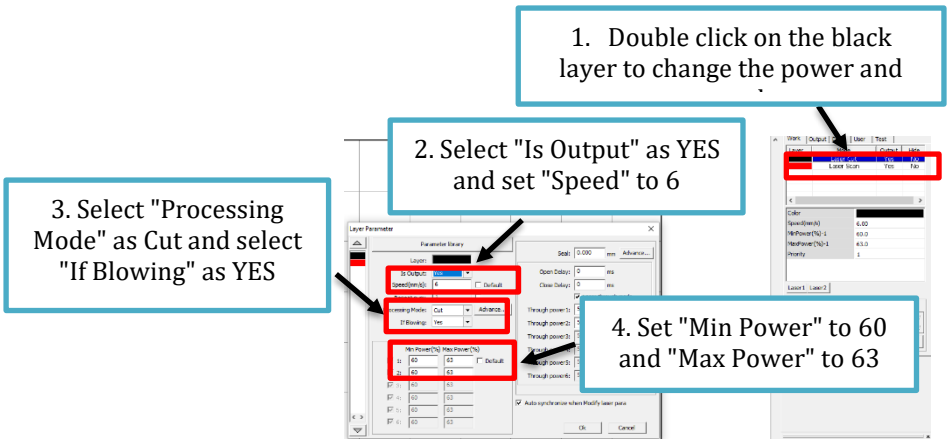


Figure 68: Select the part to cut and scan

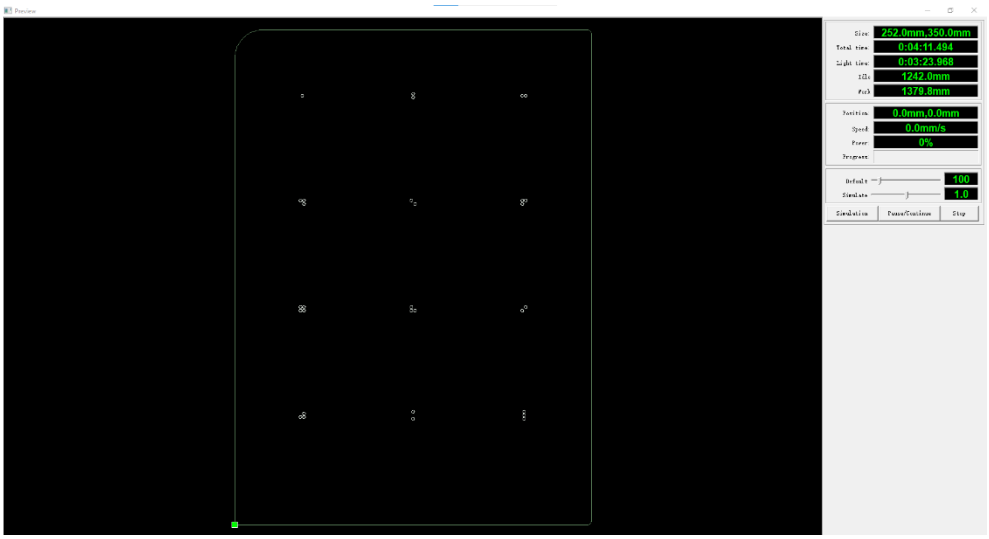


Figure 69: Check process before the machine is operated

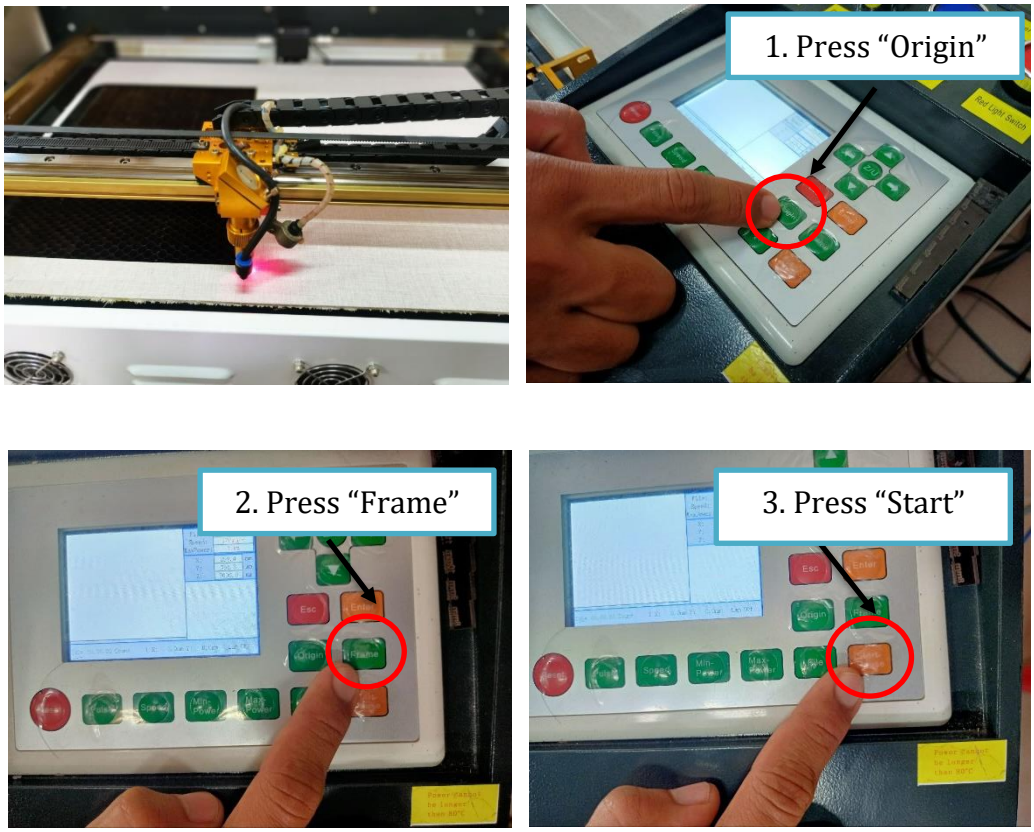


Figure 70: Test the size of the model on the machine through a sketch that has been made on the computer

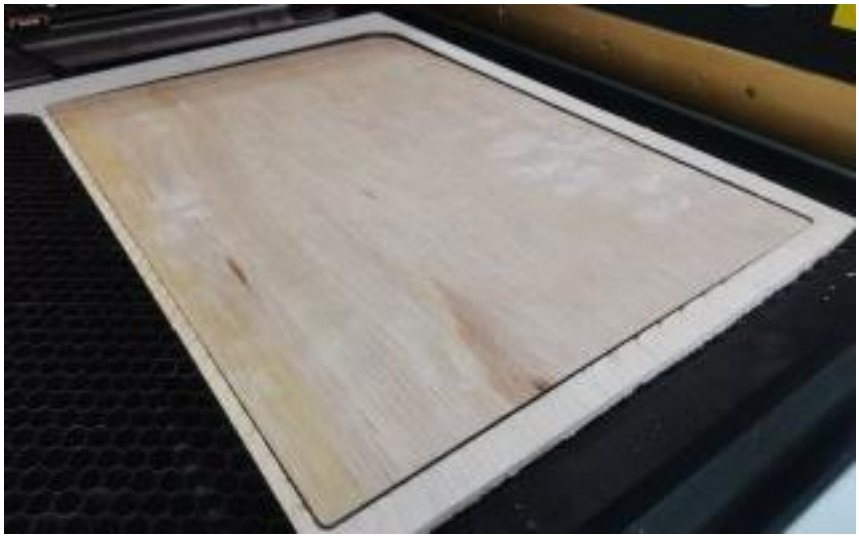


Figure 71: Result

3.7 The process of making molds using "Silicone Rubber Mold Liquid" and making braille puzzle pieces using "Epoxy Resin Clear".

3.7.1 Make braille puzzle pieces using Acyrlic

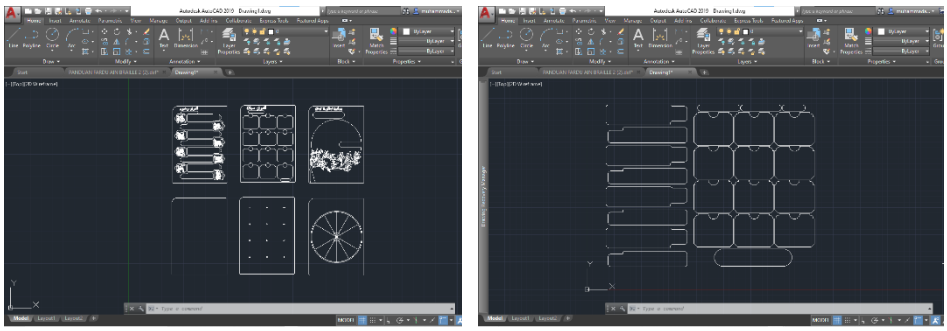


Figure 72: Open the CAD drawing, select all the braille puzzle pieces and save in DXF format.

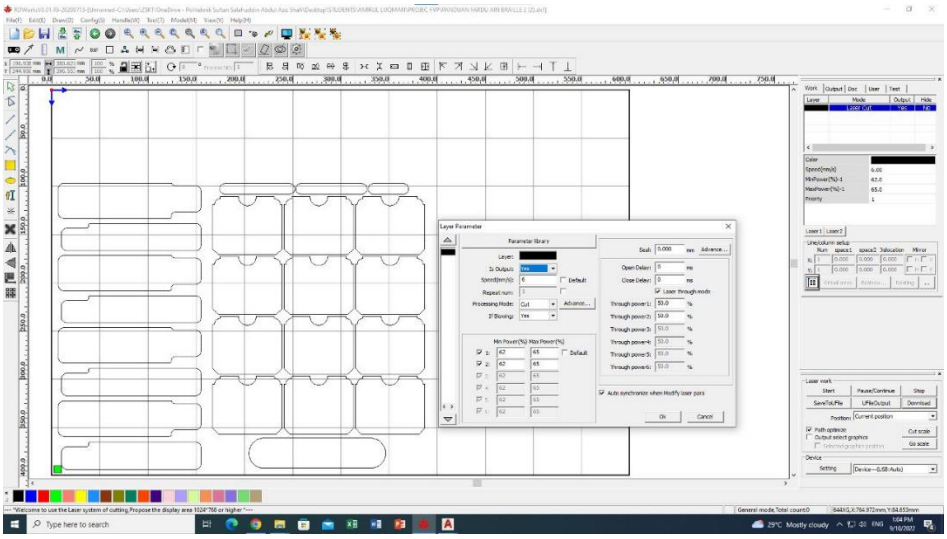


Figure 73: Select the part to cut

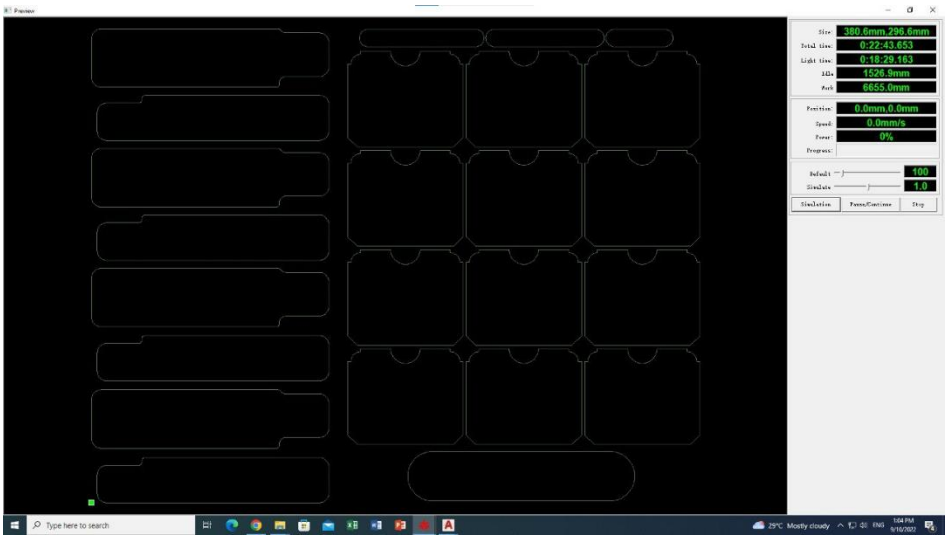


Figure 74: Check process before the machine is operated

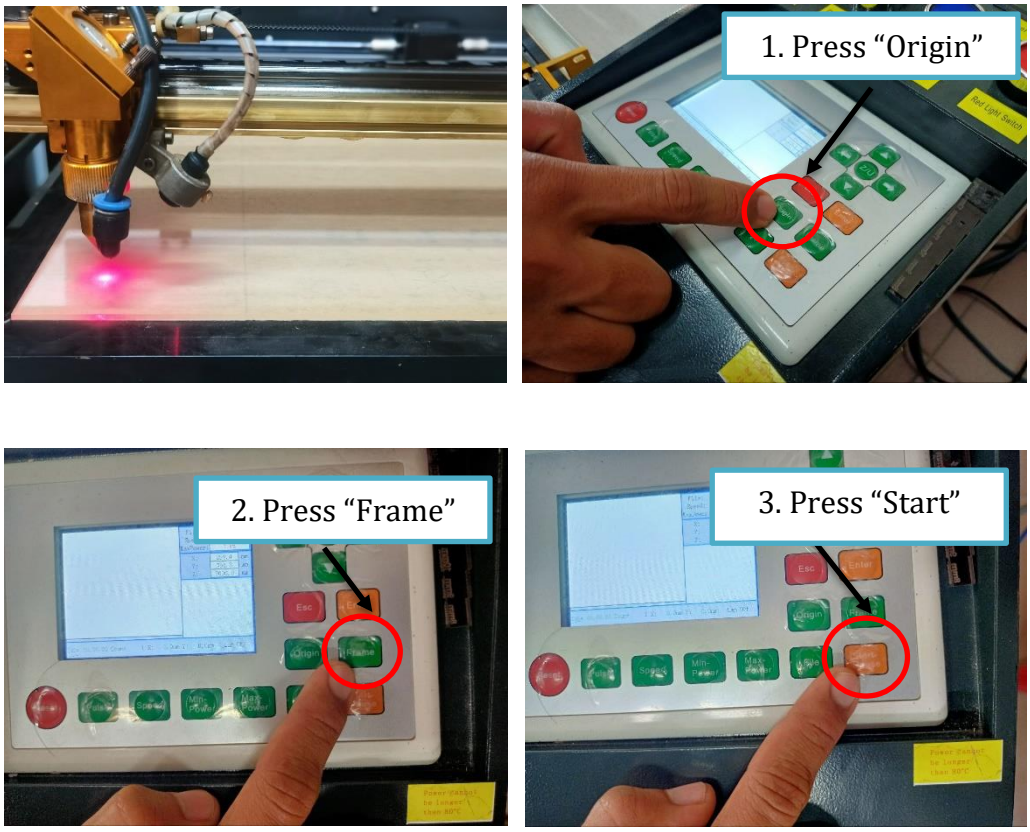


Figure 75: Test the size of the model on the machine through a sketch that has been made on the computer

Figure 76: Result

3.7.2 Steps to make a mold box

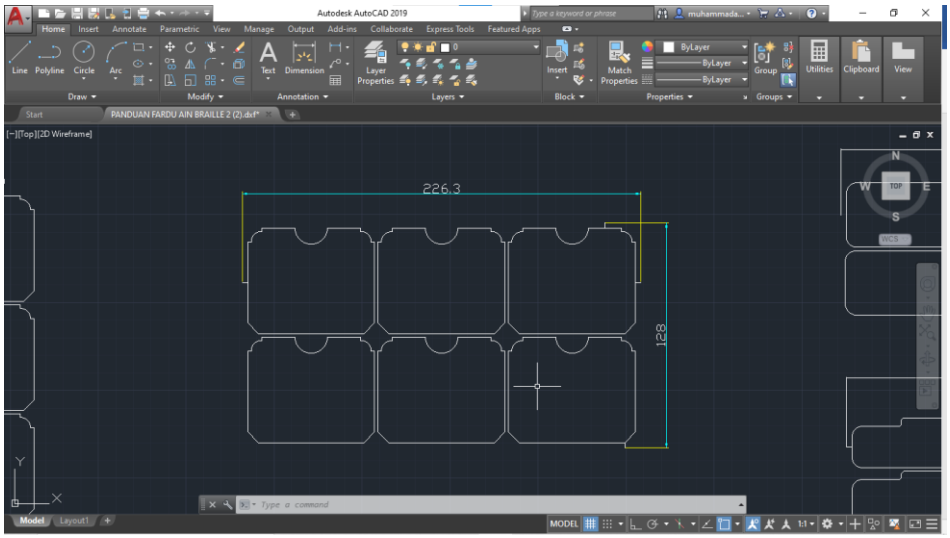


Figure 77: Open the CAD drawing, identify the dimensions of the braille puzzle pieces.

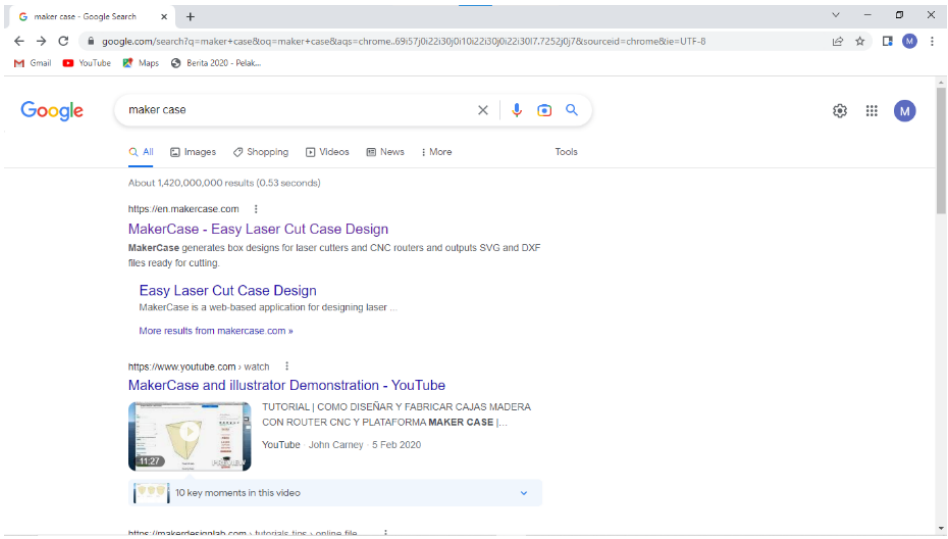


Figure 78: Open the website “MakerCase”

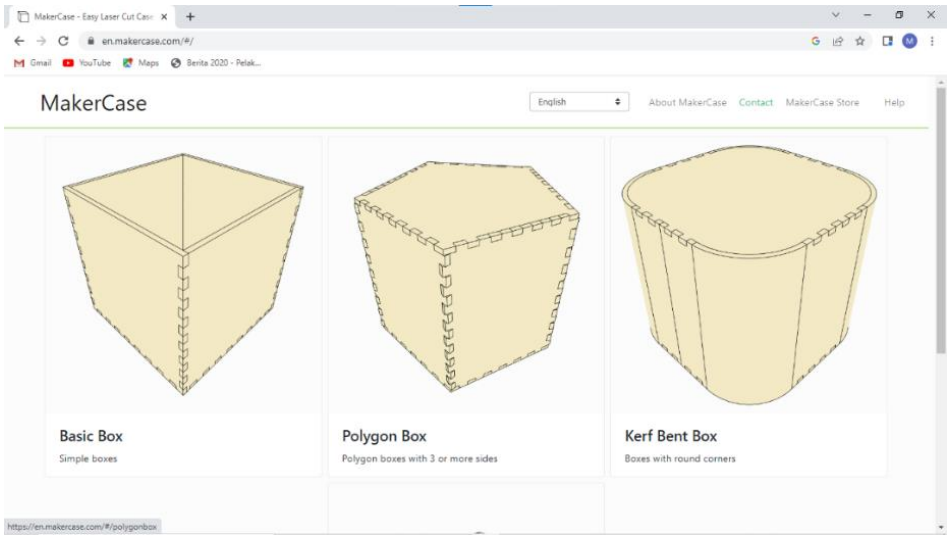


Figure 79: Views in MakerCase

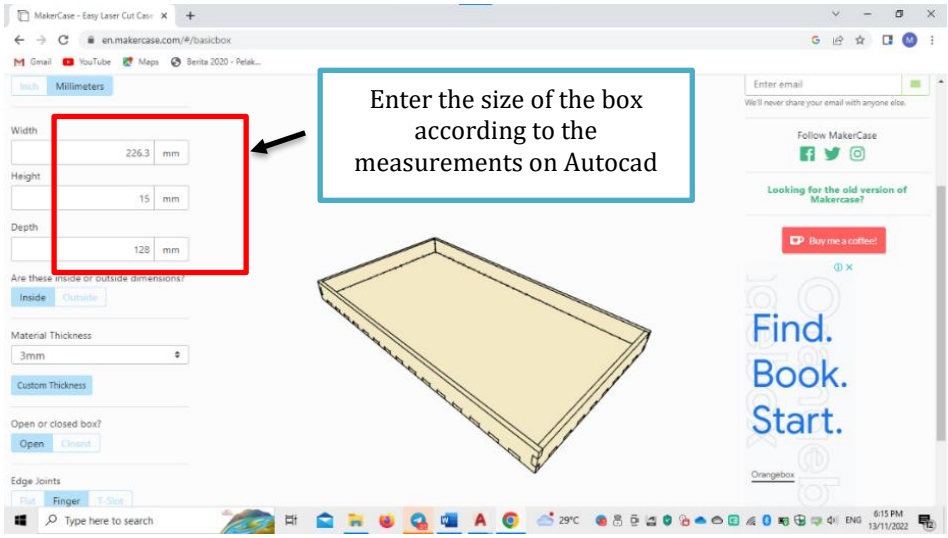


Figure 80: Enter the size of the box

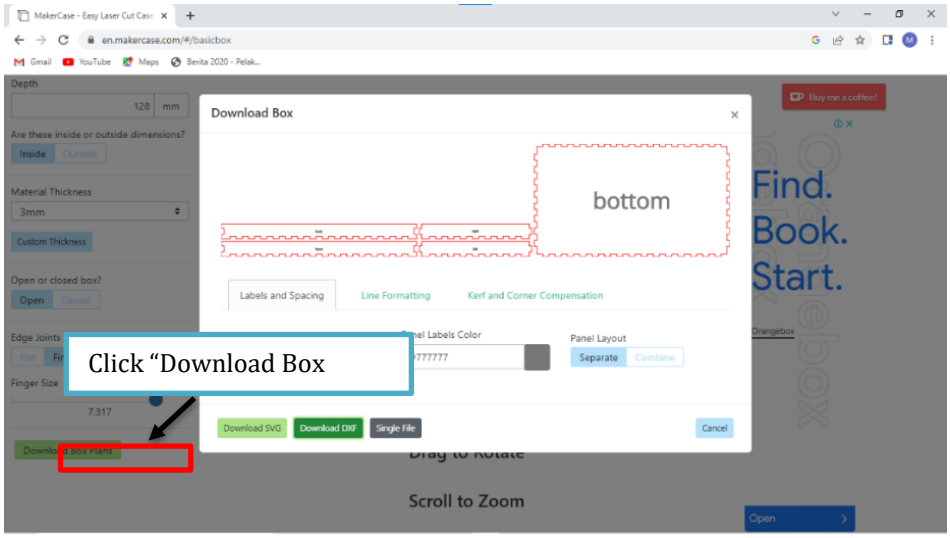
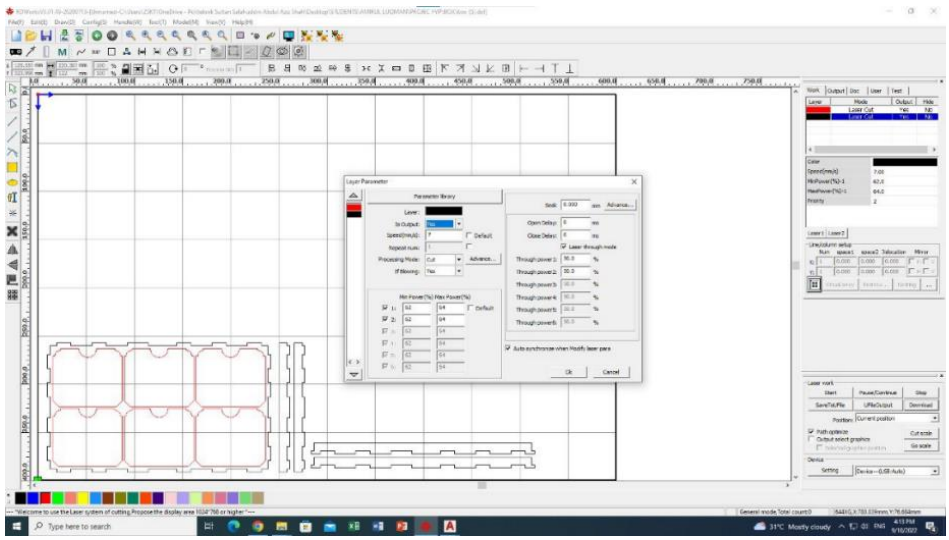


Figure 81: Download the file in DXF format



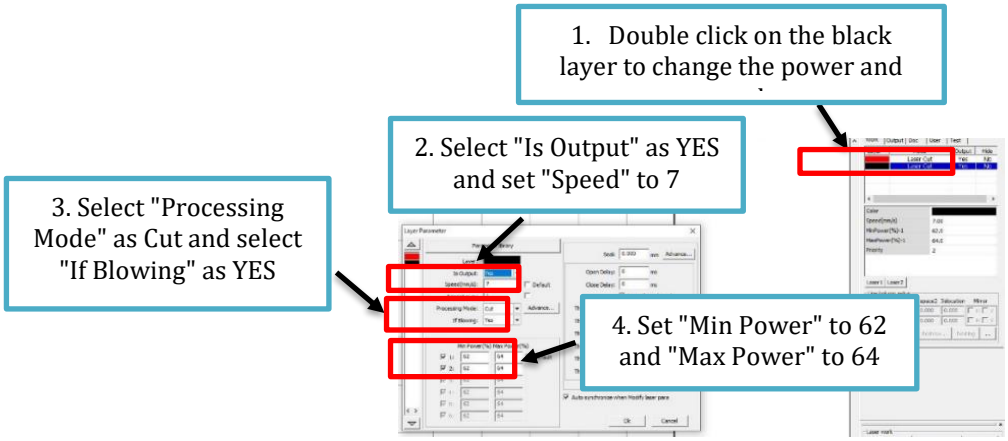
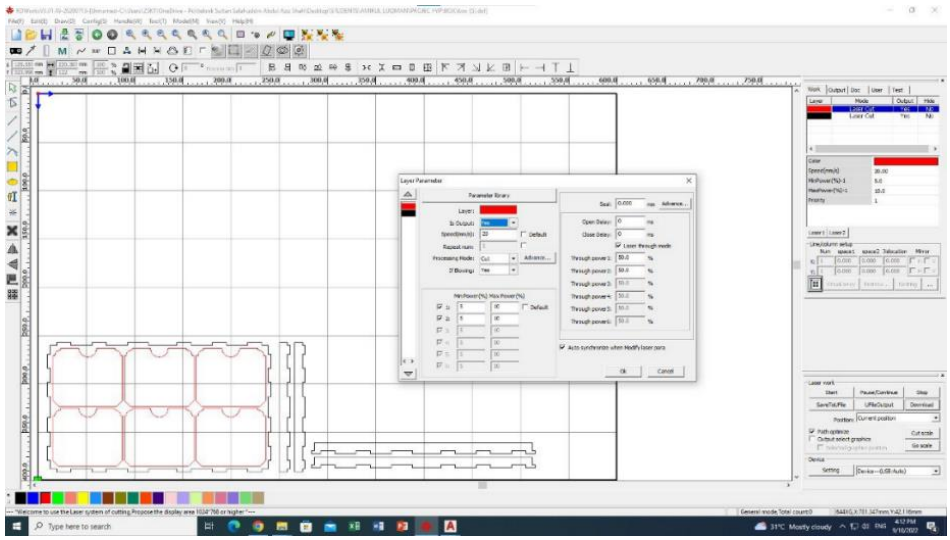


Figure 82: Select the part to cut



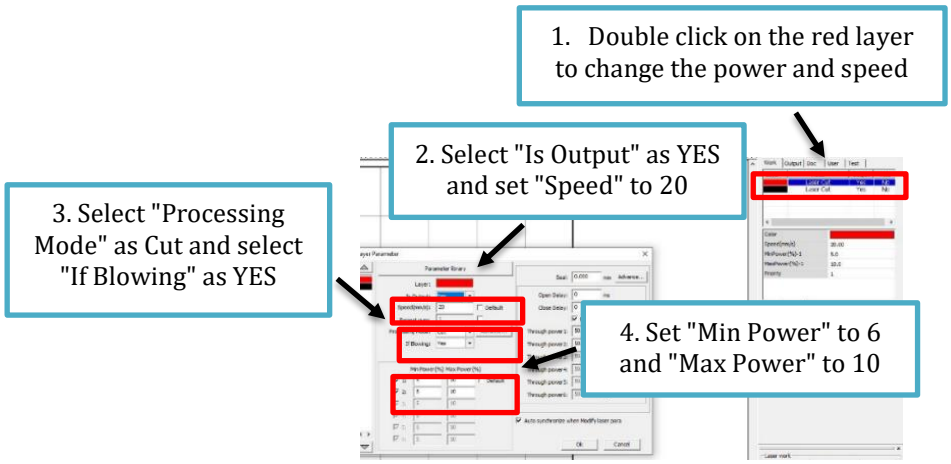
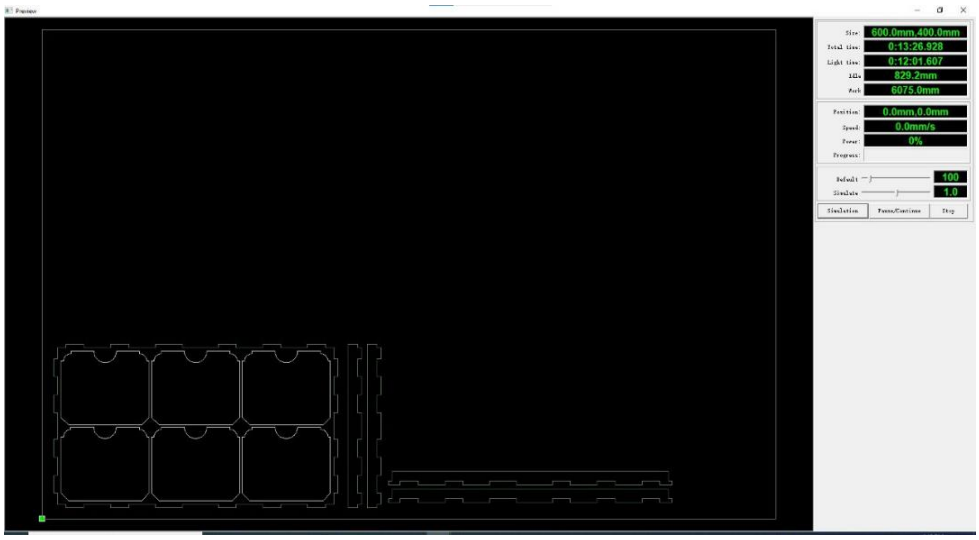
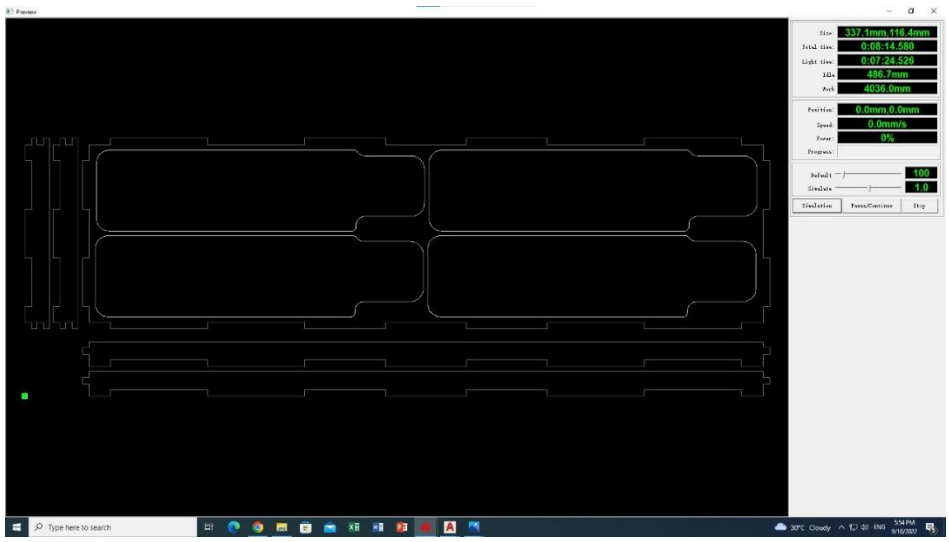
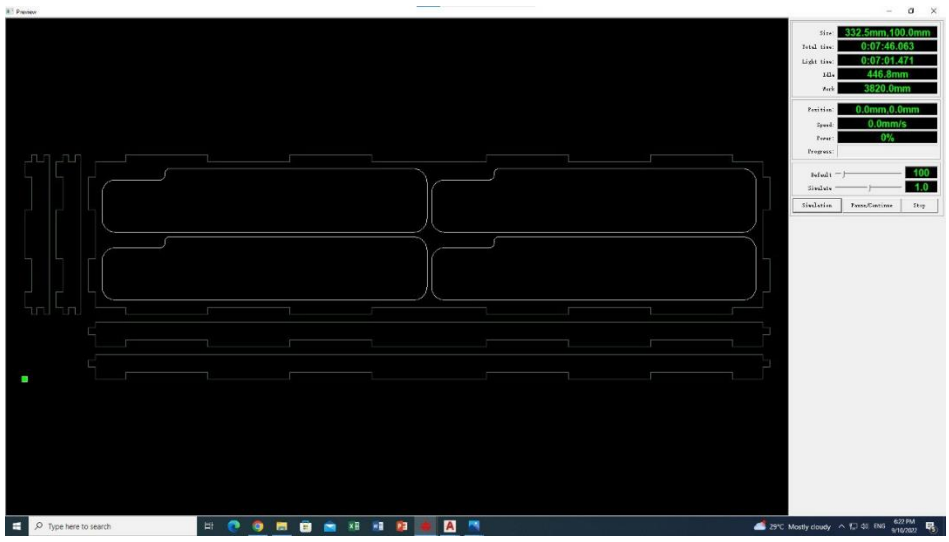


Figure 83: Select the part to cut


Preview
600.0mm,400.0mm
0:13:26.928
0:12:01.607
829.2mm
6075.0mm
0.0mm,0.0mm
0.0mm/s
0%
100
1.0
Simulation
Pause/Continue
Stop


Preview
337.1mm,116.4mm
0:08:14.580
0:07:24.526
486.7mm
4036.0mm
0.0mm,0.0mm
0.0mm/s
0%
100
1.0
Simulation
Pause/Continue
Stop
Type here to search
30°C Cloudy
5:54 PM
9/16/2020


Preview
332.5mm,100.0mm
0:07:46.063
0:07:01.471
446.8mm
3820.0mm
0.0mm,0.0mm
0.0mm/s
0%
100
1.0
Simulation
Pause/Continue
Stop
Type here to search
29°C Mostly cloudy
6:23 PM
9/16/2020

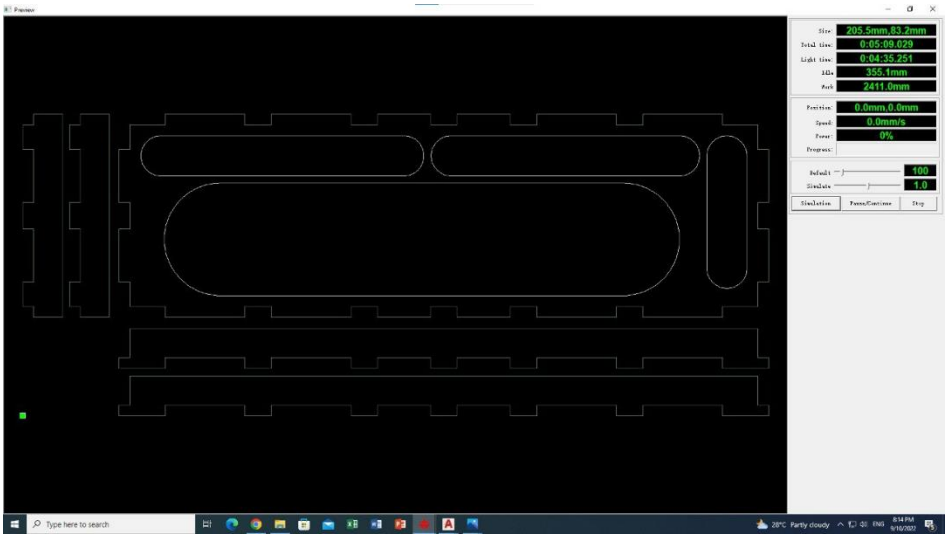


Figure 84: Check process before the machine is operated

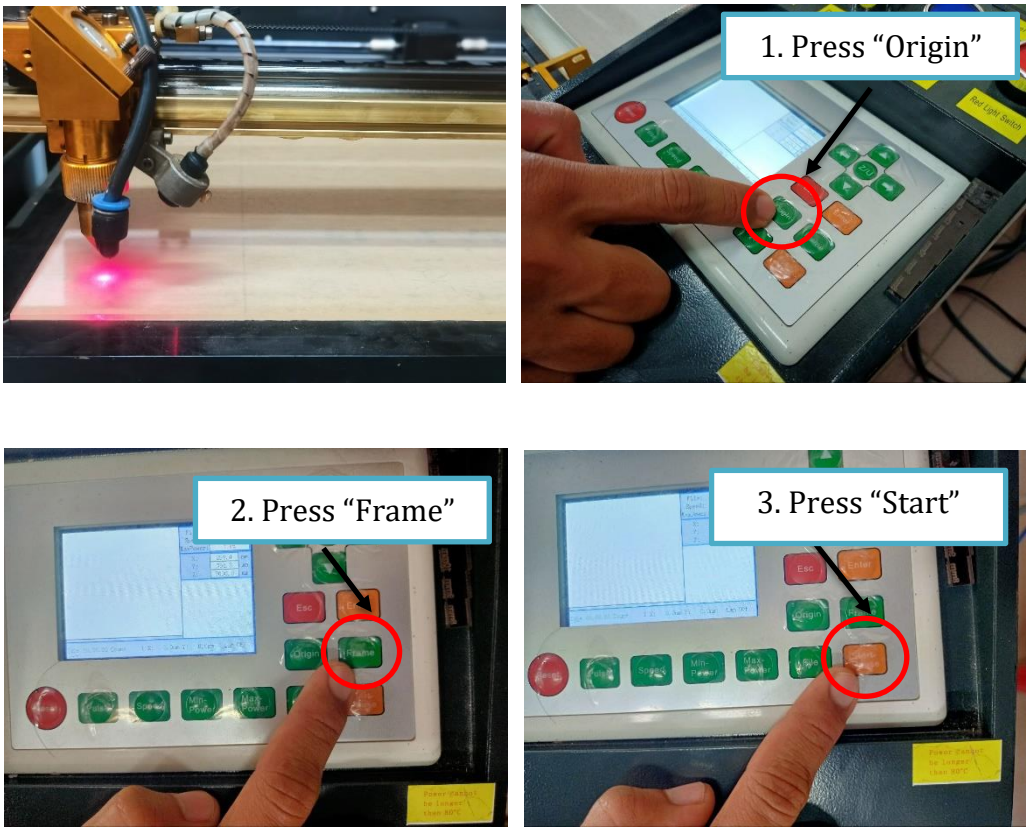


Figure 85: Test the size of the model on the machine through a sketch that has been made on the computer

3.7.3 The process of attaching "Embosser Braille Paper" to Acrylic

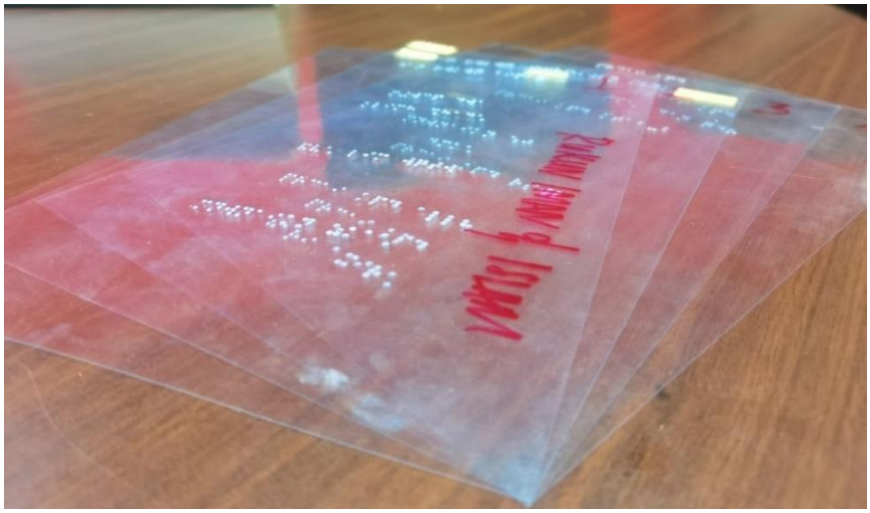


Figure 86: Print “Embosser Braille Paper” using transparent paper

Figure 87: Cut the "Embosser Braille Paper" according to the size of the braille puzzle

Figure 88: Paste "Embosser Braille Paper" on the braille puzzle using 3 second glue

Figure 89: Remove the excess "Embosser Braille Paper" on the side of the braille puzzle

Figure 90: Results

Figure 91: Paste the braille puzzle on the mold box.

Figure 92: Use the clamping spring so that the braille puzzle does not come off.

Figure 93: Results

3.7.4 The process of mixing "Silicone Rubber Molding Liquid" and "Clear Epoxy Resin".

Figure 94: Stir the "Silicone Rubber Molding Liquid" so that it is well mixed.

Figure 95: Add 2ml of hardener for every 10ml of "Silicone Rubber Molding Liquid"

Figure 96: Stir until the mixture is combined.

Figure 97: Pour the mixture into the mold container that has been prepared.

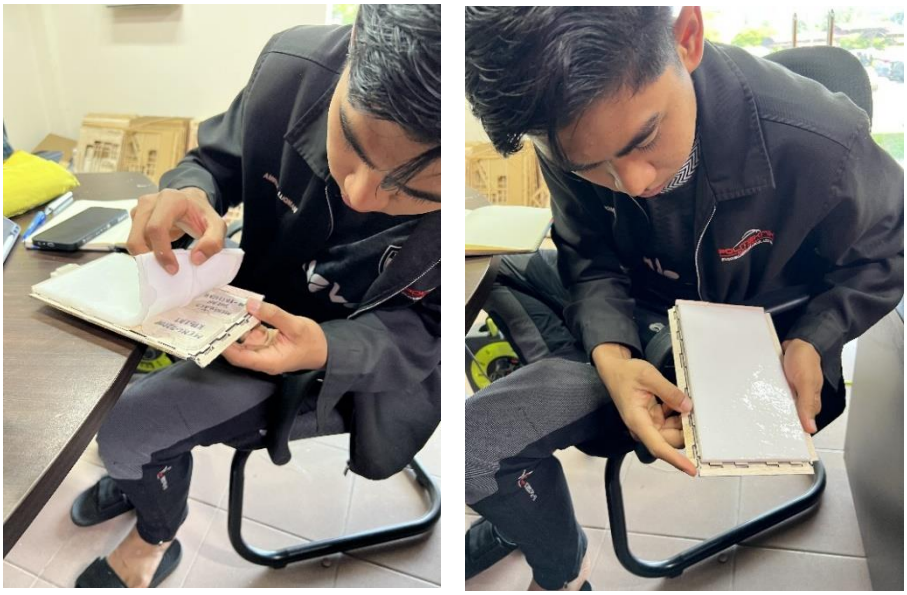
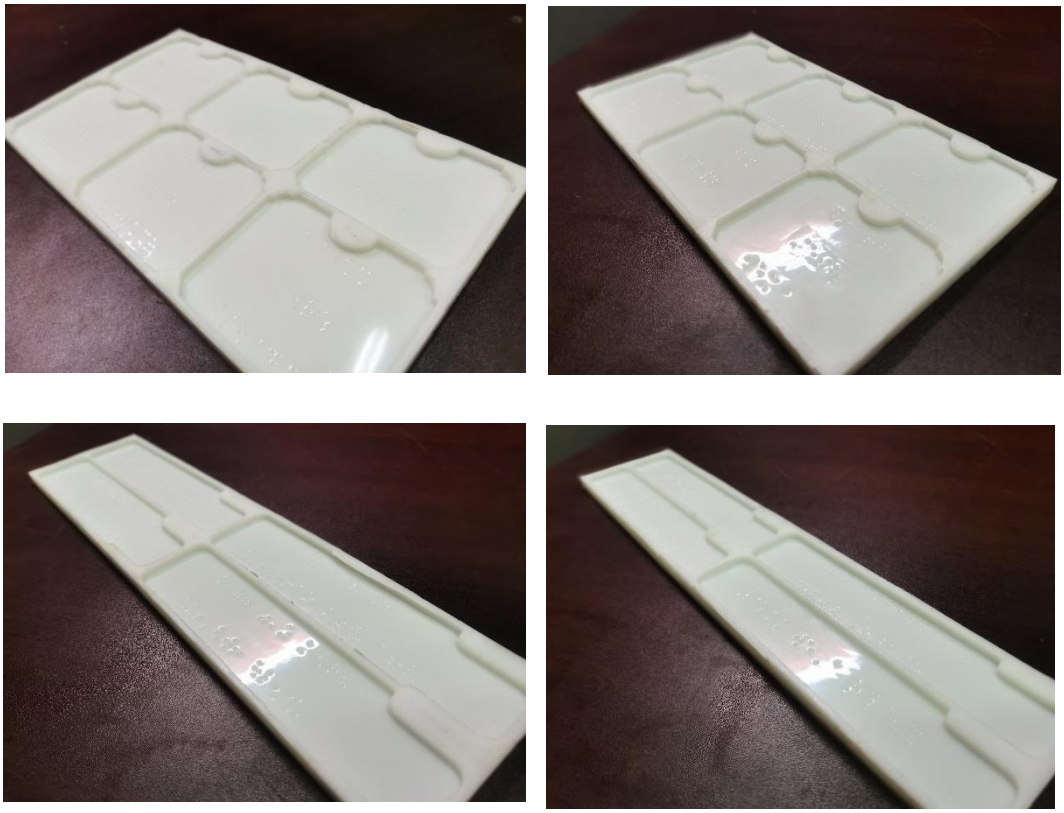


Figure 98: Open the mold box and remove the "Silicone Rubber Molding Liquid".



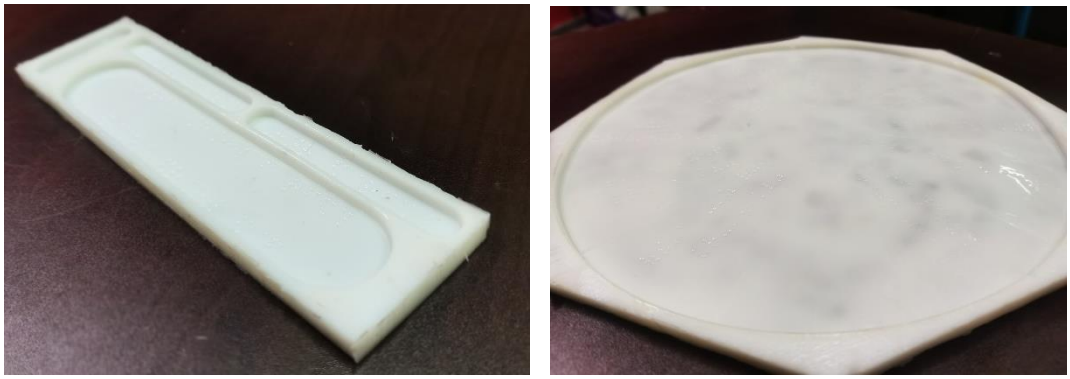


Figure 99: Results

Figure 100: Put 450ml Resin in a measuring jug.

Figure 101: Put 150ml of Hardener in a measuring jug and mix well.

Figure 102: Add the coloring to the mixture and stir until it is combined.

Figure 103: Pour Epoxy Resin on the "Silicone Rubber Molding Liquid" that has been made.

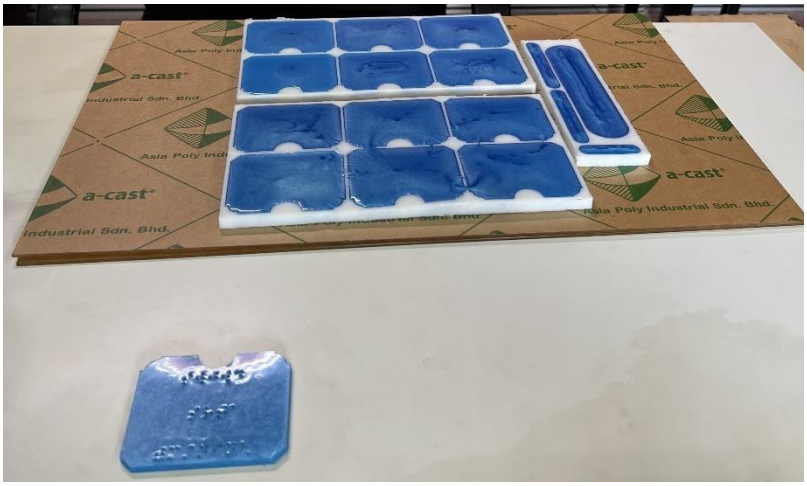


Figure 104: Results

3.8 Assembly and Finishing

Every process of making wood products must have a finishing assembly for the purpose of joining, finishing and beautifying a product. We only use a few tools for tidying up our Braille Panduan Fardu Ain. Among the materials and tools we use are:

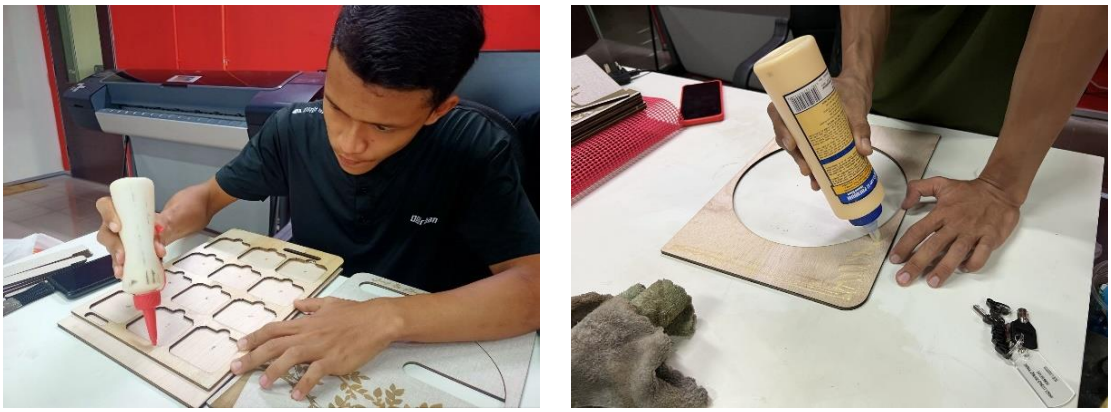


Figure 105: Glue both the bottom and top parts together using wood glue.

Figure 106: Use paper clips to keep the workpiece from moving.

Figure 107: Finish the product using clear spray.

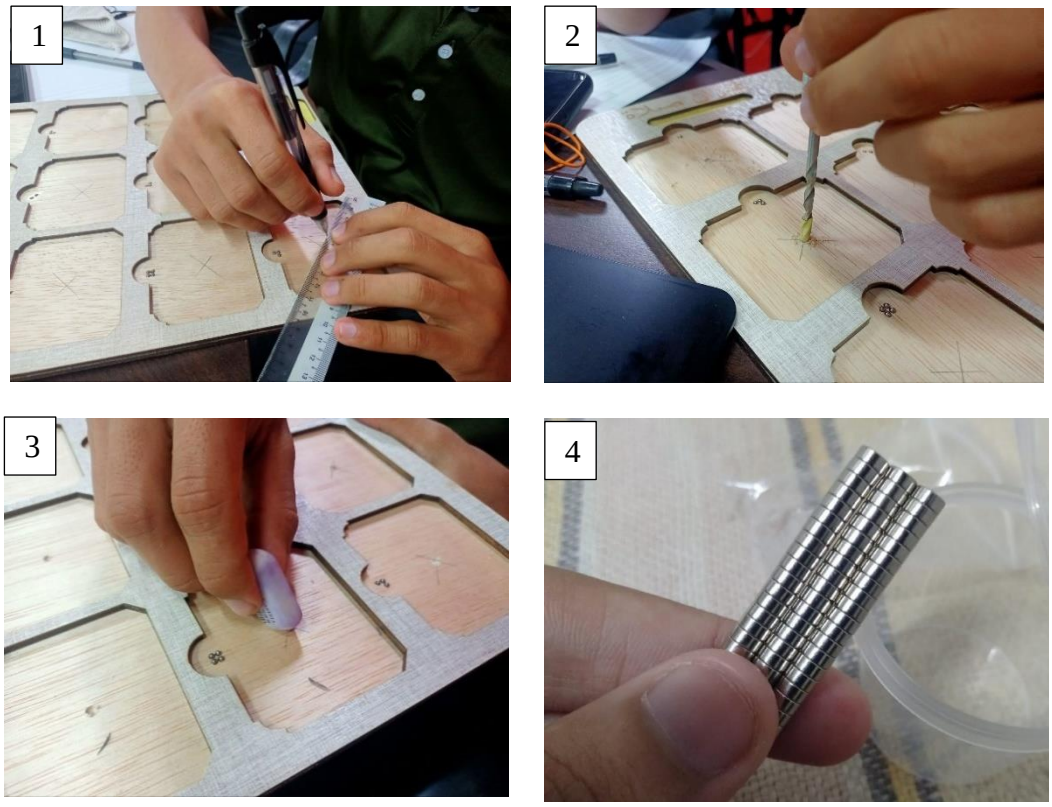


Figure 108: The process of installing magnets.

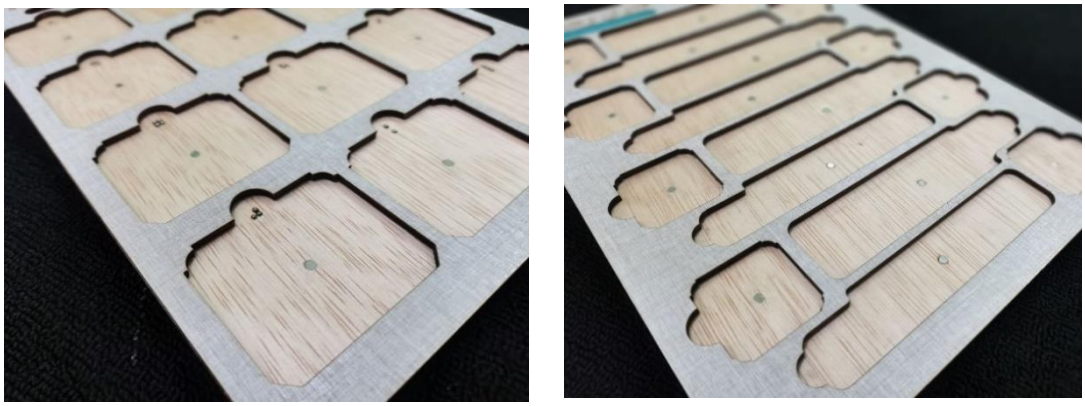


Figure 109: Results

Figure 110: The process of flattening the surface of the braille puzzle.

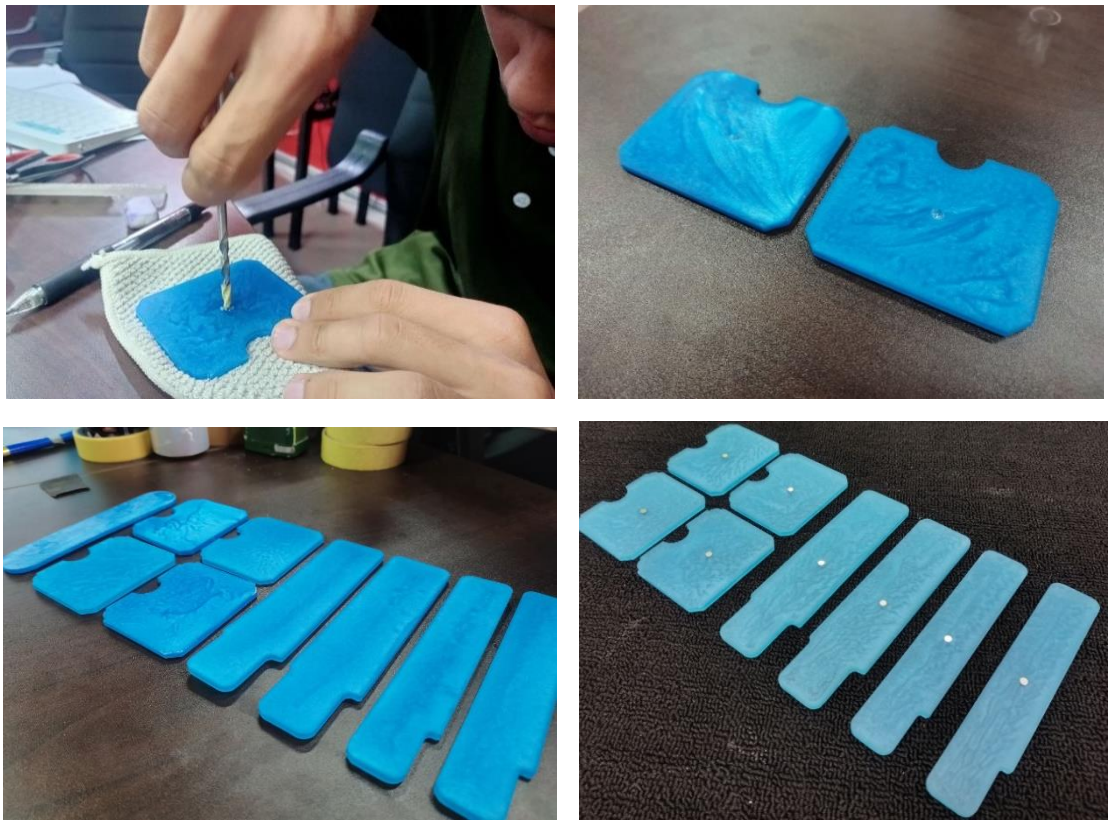


Figure 111: The process of installing magnets on a braille puzzle.

Figure 112: The process of installing ball bearings.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

We have conducted an in-depth study of our products based on the Fardu Ain Guide. To achieve our desire to create teaching aids for the visually impaired. With this, we have found various resources and references from the Malaysian Muslim Visually Impaired Association (PERTIS). We also made appointments at schools that operate special programs for children with disabilities to test the level of effectiveness of prototypes.

4.2 Prototype Project

The prototype that we produce gives many benefits to its users. The method we use can be easily understood by teachers including parents. This is because the Fardu Ain Guide Braille game is equipped with a manual book. While in terms of writing, using Jawi writing can be clearly understood by students. Every piece of writing we write is checked by Ustaz Khusyari from the *Persatuan Cacat Penglihatan Islam Malaysia* (PERTIS).

In terms of design, we provide three sets of games that include a prayer guide, an ablution guide, and the pillars of faith & Islam. The design is very user-friendly. it is also easy to carry and easy to store. This is because this design comes with a bag to make it easier to store and carry this prototype Design.

4.3 Expected results

From the beginning of our project discussion, we have decided that we want to give our Fardu Ain Braille Guide to any special children's school in Putrajaya primary school and center for the blind. After our Braille Sozler was ready, we visited SK PUTRAJAYA PRESENT 18(1) to test the effectiveness of our product before we gave it away our product. He gave good feedback and appreciated our efforts to make learning materials for special children easier and more fun.

Figure 113: Description of how to use Braille Prayer Guide.

Figure 114: Explanation of how to use Braille for the Prayer Guide and Braille for the Ablution Guide.

Figure 115: Explanation of how to use the Pillars of Faith & Pillars of Islam.

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Figure 116: The atmosphere when the program is in progress.

4.4 Feedback and improvement

From the tests carried out, we produced this Questionnaire to prove the level of effectiveness of this prototype to users. The questionnaire was used in Malay and was given to the teaching staff of SK PUTRAJAYA PRESENT 18(1) to find out their feedback about the effectiveness of the Fardu Ain Guide Braille game prototype.

JANTINA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lelaki	2	28.6	28.6	28.6
	Perempuan	5	71.4	71.4	100.0
	Total	7	100.0	100.0	

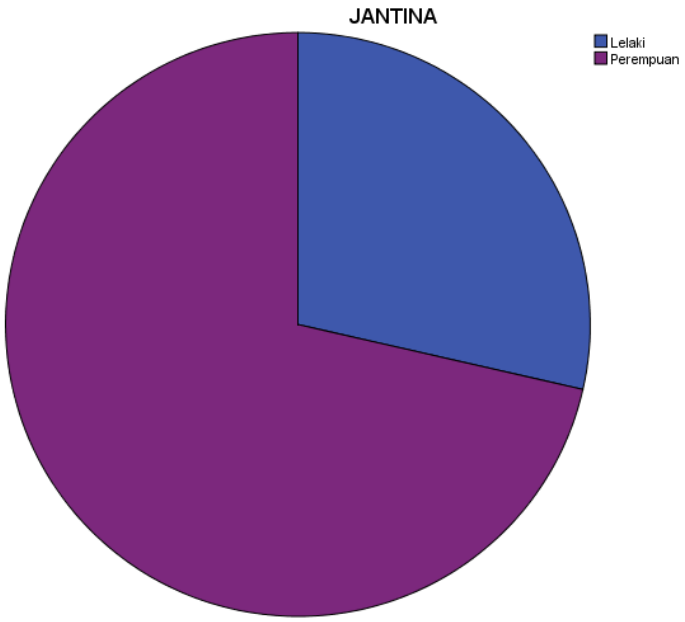

Figure 117: Shows the gender of the respondents.

Subjek Yang Diajar : (cth. Sejarah)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BAHASA MELAYU	2	28.6	28.6	28.6
	SEJARAH	1	14.3	14.3	42.9
	SAINS	1	14.3	14.3	57.1
	PENDIDIKAN ISLAM	1	14.3	14.3	71.4
	MATEMATIK	1	14.3	14.3	85.7
	GEOGRAFI	1	14.3	14.3	100.0
	Total	7	100.0	100.0	

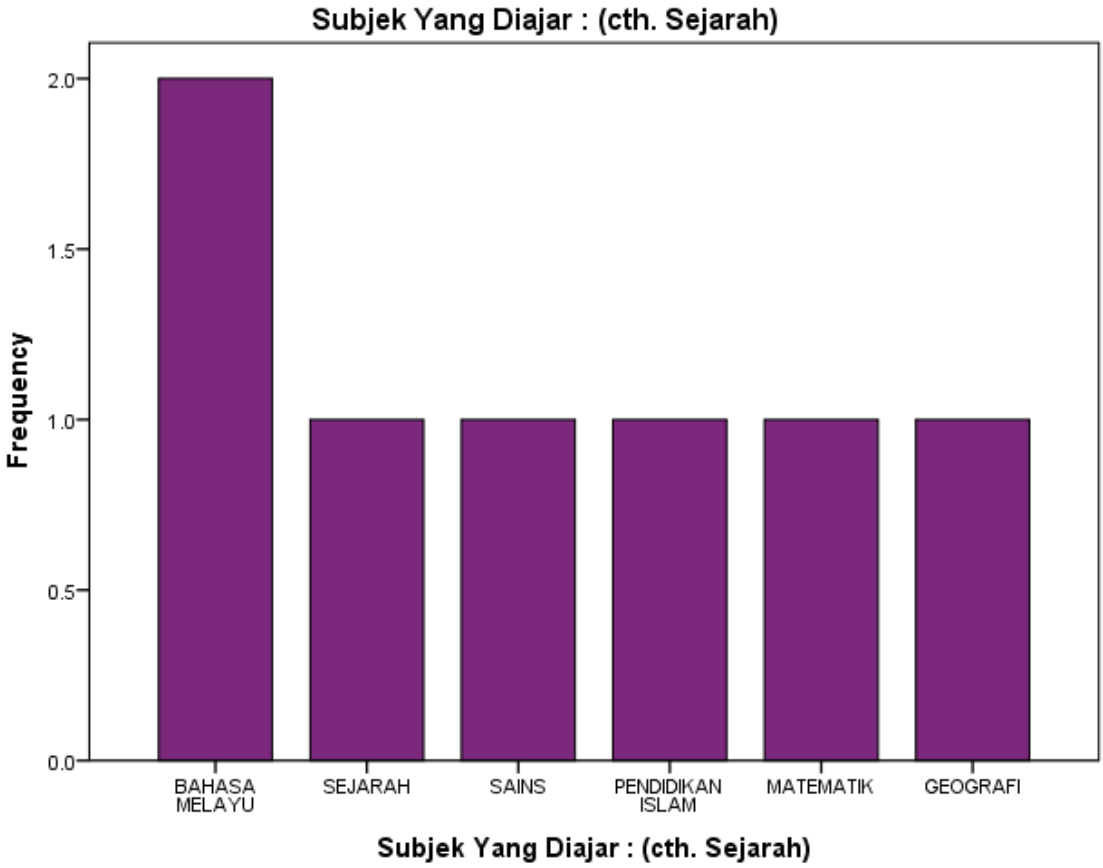

Figure 118: Showing Subjects Taught by respondents

Braille Panduan Fardu Ain meningkatkan kefahaman pelajar

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	5	71.4	71.4	71.4
	Sangat setuju	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

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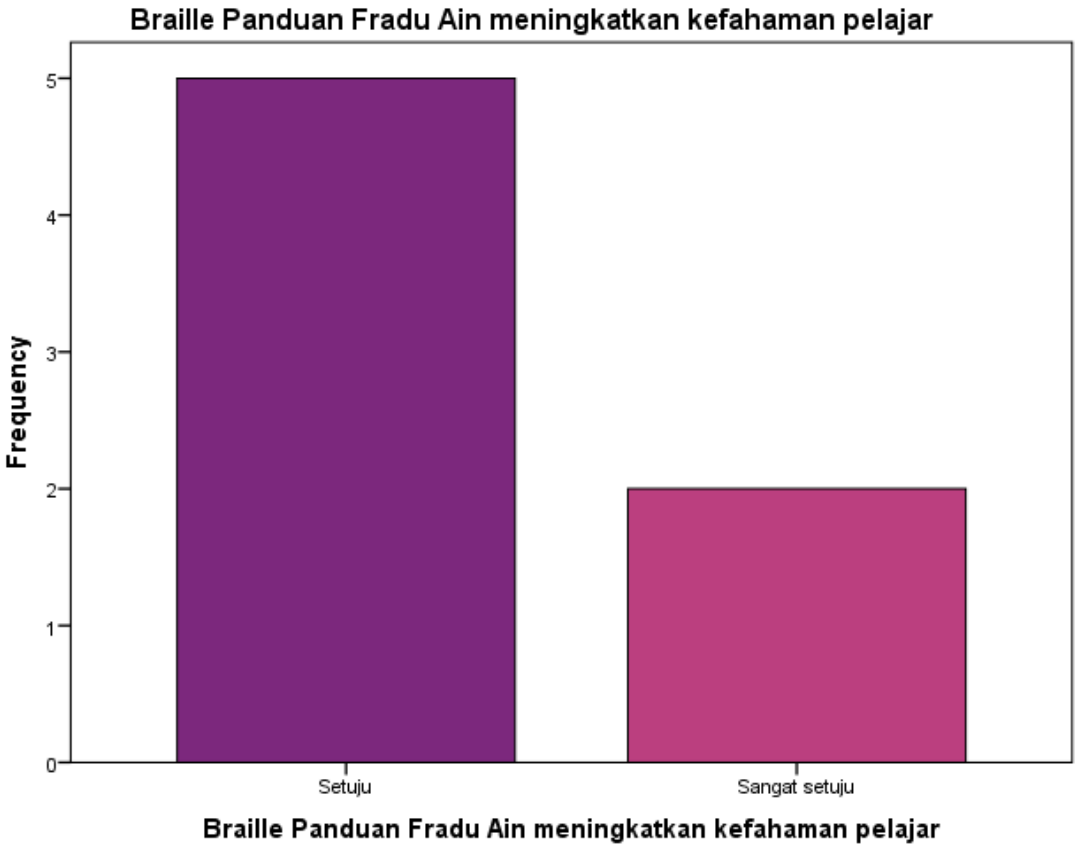

Figure 119: Showing Fradu Ain Guide Braille improves student understanding

Table 119 shows the majority of 71.4% of respondents agree that Fardu Ain's Braille Guide Increases student understanding because the teaching method can give students a good understanding even if they don't focus on reading material only. While 28.6% of respondents strongly agree that Fardu Ain's Braille Guide improves students' understanding well.

Reka bentuk Braille Panduan Fardu Ain di atas dapat mempercepatkan proses pengetahuan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	4	57.1	57.1	57.1
	Sangat setuju	3	42.9	42.9	100.0
	Total	7	100.0	100.0	

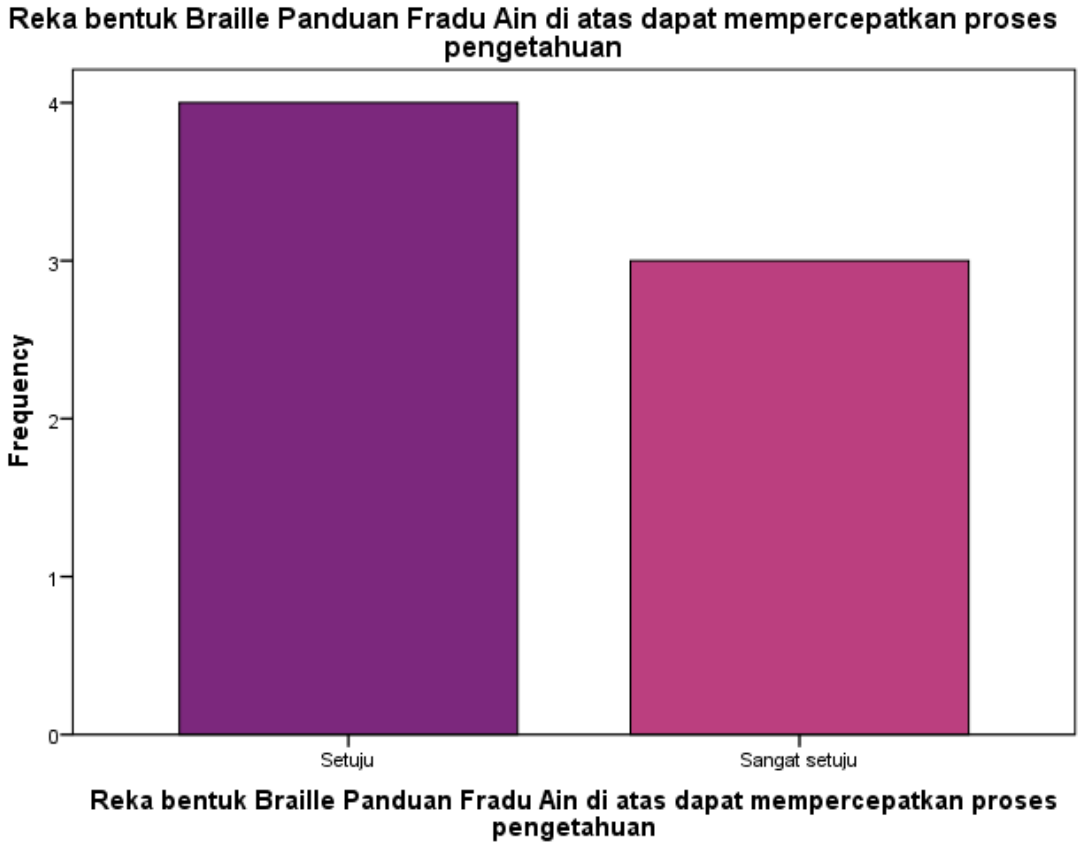

Figure 120: shows how fast speed up the knowledge process

Table 120 above shows 42.9% strongly agree that Fardu Ain's Braille Design Guide can speed up the knowledge process of visually impaired children. This is because the game's design and concept can be easily understood. Even this design also comes with a manual. While 57.1% of respondents agreed that Fardu Ain's Braille Design Guide can speed up the learning process of visually impaired children.

Penggunaan kaedah permainan dapat menarik minat pelajar

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	3	42.9	42.9	42.9
	Sangat setuju	4	57.1	57.1	100.0
	Total	7	100.0	100.0	

Figure 121: Shows that the use of game methods can attract students' interest.

Figure 121 above shows the majority of 57.1% of respondents agree that the use of game methods can attract students' interest to reduce visual efforts. This is because, most children like to play, so the learning method while learning can attract many people's interest. Even as many as 42.9% agreed that the use of game methods can attract students to reduce visual efforts.

Penggunaan tulisan Jawi dalam bahan bantu mengajar dapat menarik minat pelajar dalam penulisan Jawi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	5	71.4	71.4	71.4
	Sangat setuju	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

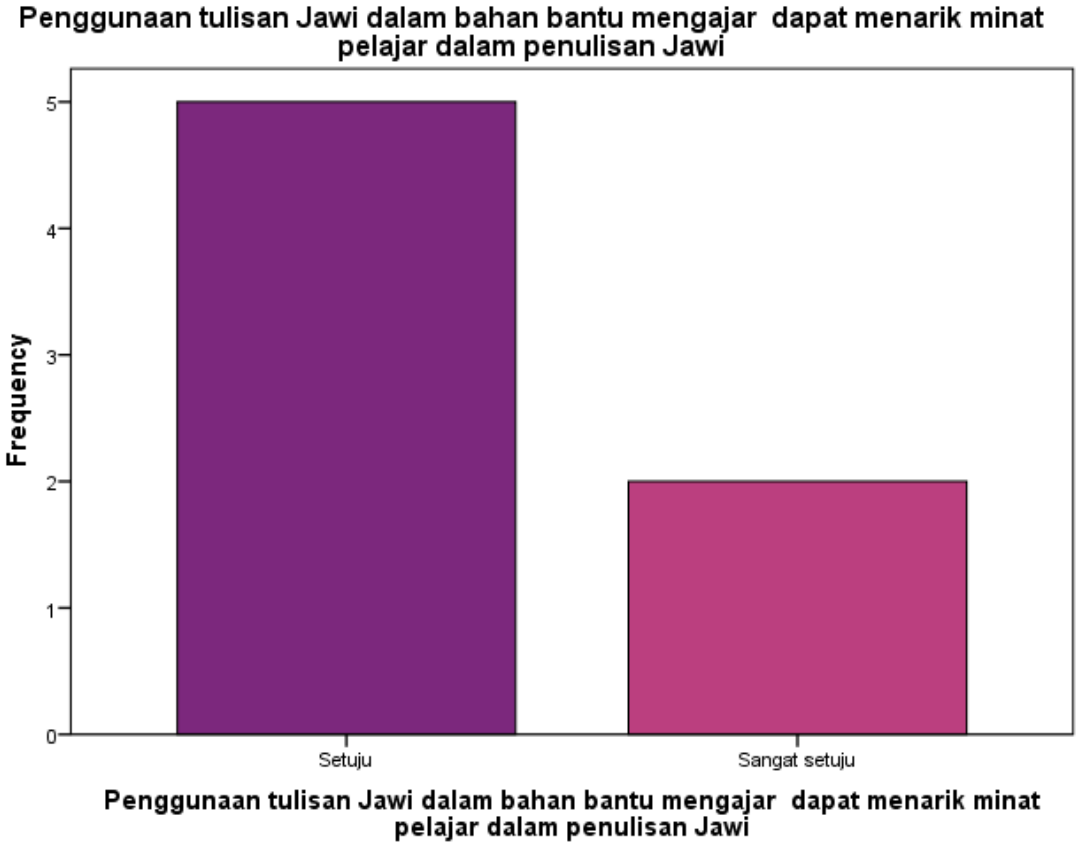

Figure 122: Shows that the use of Jawi writing in teaching aids can attract students.

Figure 122 above shows that 71.4% of respondents agree that the use of Jawi writing in teaching aids can attract students' interest in Jawi writing. As we all know, the use of Jawi writing is now receiving less attention and causing many young people to ignore it. So with this method, we can at least increase their interest from a young age and increase the use of Jawi writing. At least 28.6% strongly agree that the use of Jawi writing in teaching aids can attract students' interest in Jawi writing.

Produk ini mempunyai aspek keselamatan yang sesuai untuk kanak-kanak

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	7	100.0	100.0	100.0

Figure 123: Indicates that this product has safety aspects suitable for children.

Figure 123 shows that all respondents agree that this product has safety aspects suitable for children. This is because the prototype we produce focuses on safety features. We use the laminated board as our main material and include the use of other materials such as various magnets, ball bearings, and plastic. we also do testing at PERTIS to produce products that are safe for visually impaired children.

Sesuai digunakan pada usia 7 hingga 12 tahun

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	5	71.4	71.4	71.4
	Sangat setuju	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

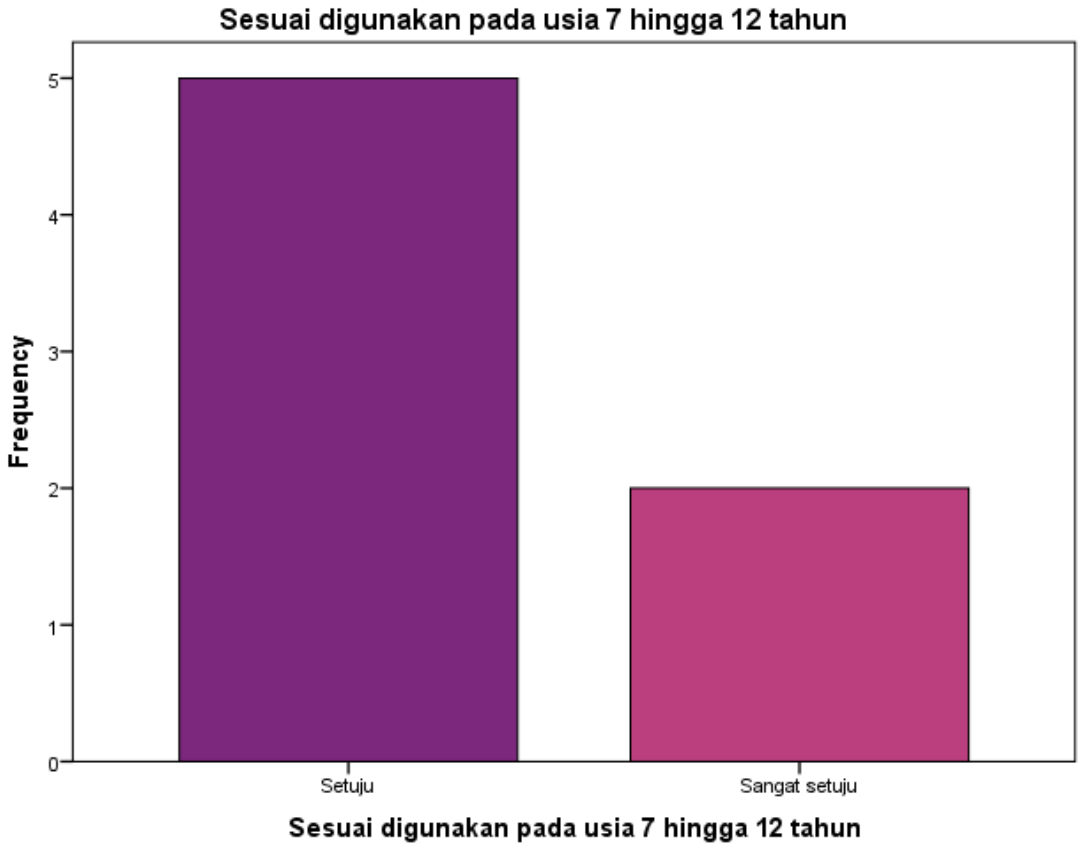

Figure 124: Suitable for use at the age of 7 to 12 years.

Figure 124 shows the number of respondents agreeing to accept Fardu Ain Guide Braille as suitable for use at the age of 7 to 12 years which is 71.4%. At this age, visually impaired children can read Jawi writing well and record fluently with Pardu Ain before they reach puberty. Meanwhile, 28.6% strongly agreed that Fardu Ain Guide Braille Game is suitable for use at the age of 7 to 12 years.

Braille Panduan Fardu Ain memudahkan sesi pembelajaran

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	4	57.1	57.1	57.1
	Sangat setuju	3	42.9	42.9	100.0
	Total	7	100.0	100.0	

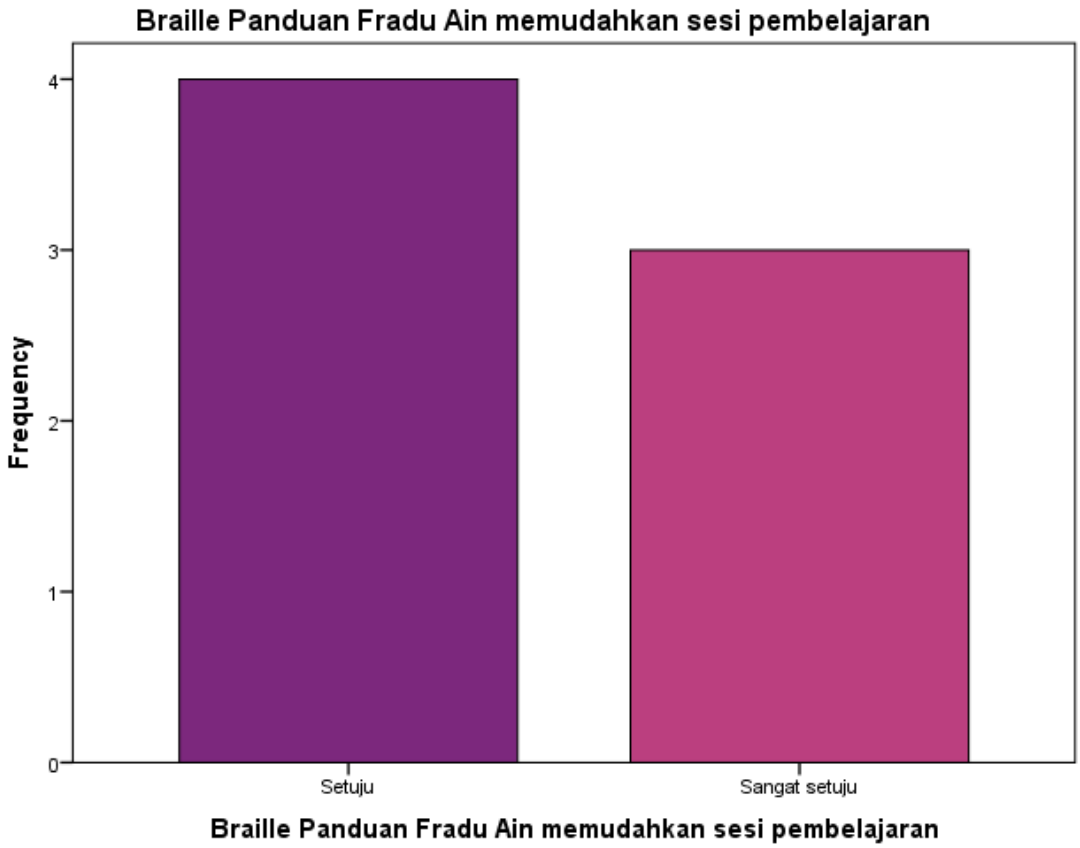

Figure 125: showing Fardu Ain's Braille Guide facilitates the learning session.

Figure 125 above shows 57.1% agree Braille Game Guide Fardu Ain facilitates the learning session because it becomes additional material for the instructor and an attraction for visually impaired children. Of course, 42.9% strongly agree that the Braille Fardu Ain Guide game facilitates the learning session.

Mudah untuk dibawa dan disimpan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Setuju	5	71.4	71.4	71.4
	Sangat setuju	2	28.6	28.6	100.0
	Total	7	100.0	100.0	

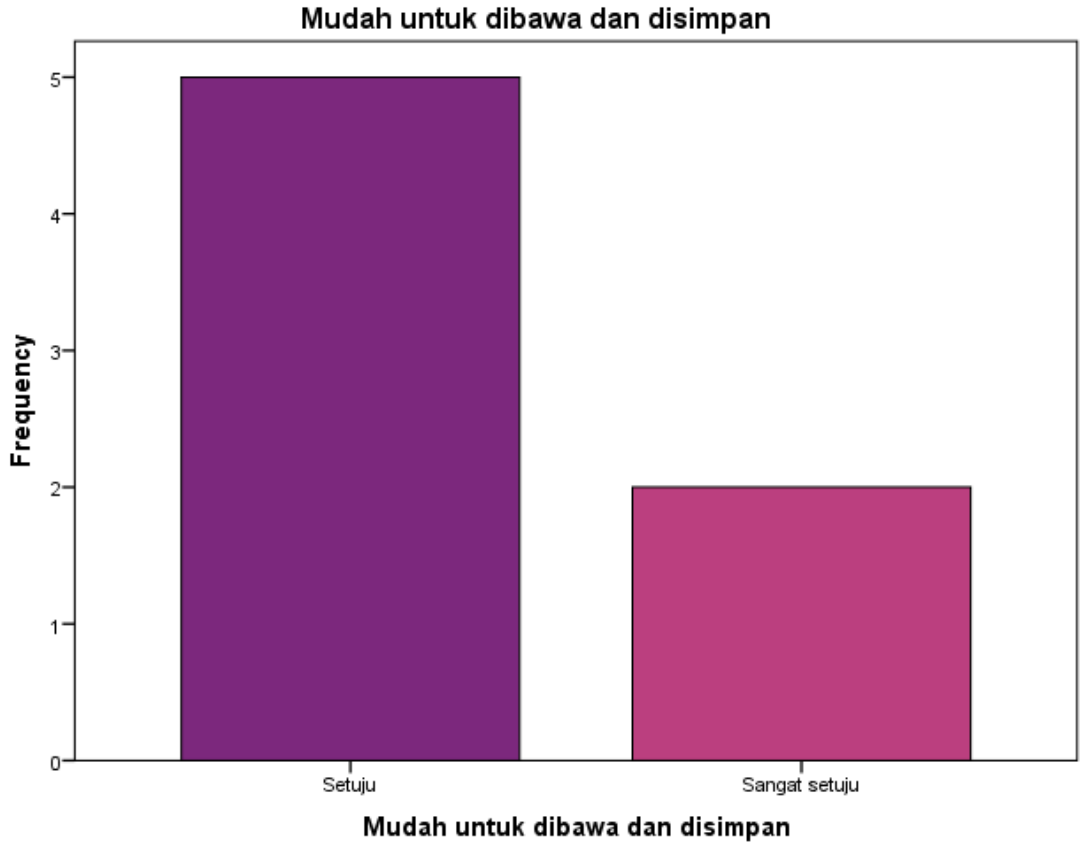

Figure 126: shows Easy to carry and store.

Figure 126 shows that 71.4% of total respondents agree and 28.6% of respondents strongly agree that Fardu Ain's Braille game is easy to carry and store. This can be proven by the size of the game itself and on the said game set there are magnets to prevent the game set from falling. With this, Braille games can be easily stored, and we even provide a set of bags to further simplify the storage process and to carry.

Adakah bahan bantu mengajar Braille Fardu Ain ini merupakan produk yang pertama di Malaysia?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ya	7	100.0	100.0	100.0

Figure 127: Is this Fardu Ain Braille teaching aid the first product in Malaysia.

Figure 127 shows the majority of respondents stating that this Fardu Ain Braille Game is the first product in Malaysia.

Adakah guru atau ibubapa diluar sana bersetuju untuk menjadikan produk kami sebagai bahan tambahan pembelajaran bagi skop fardu ain?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ya	7	100.0	100.0	100.0

Figure 128: show whether teachers or parents out there agree to make our product an additional learning material for the scope of fardu ain.

Figure 128 shows whether teachers or parents out there agree to make our product an additional learning material for the scope of fardu ain. The percentage shows that the majority of respondents agree with Fardu Ain's Braille Game as additional learning material.

Harga bagi satu set Braille Panduan Fardu Ain ini adalah RM370.00. Adakah ia berpatutan?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ya	7	100.0	100.0	100.0

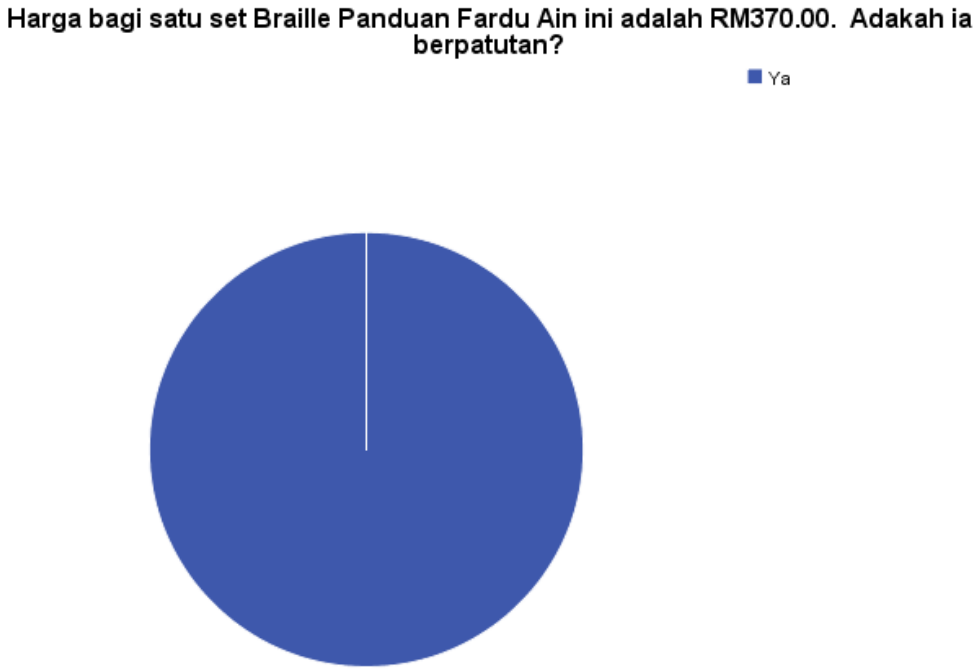

Figure 129: Shows The price for a set of Fardu Ain's Braille Guide is RM370.00. Is it affordable.

Figure 129 shows the majority of respondents stating that the price for the Fardu Ain Braille Game is reasonable at RM370.00.

4.4 Feedback and Improvement

From the program, we run and the feedback we get from the respondents. the majority stated that our product prototype was very helpful in the learning process as a teaching aid. Among the responses we received were:

Feedback

• User-friendly for teachers, parents and visually impaired students.

• Suitable for the education of visually impaired children and not very clear vision.

• Products that are attractive and can be released or introduced more widely.

• Assist special education teachers in providing education.

• encourage and attract visually impaired children.

Improvement

The education teacher of SK PUTRAJAYA PRESINT 18(1) stated that Fardu Ain's Braille Guide has advantages and high potential to be used as an additional tool in learning. They intend to introduce this additional tool in every learning subject at school. Here, it is proven that this game is in high demand among the teaching staff. however, there are still some improvements that need to be made in terms of adding materials, including adding glow in the dark in the game part. This addition can help partially sighted children see each part of the puzzle at night. it can also help children if each puzzle falls.

CHAPTER 5

5.1 Conclusions

At the end of the study, the project work of this final report requires cooperation from colleagues and supervisors for us to complete this assignment. The explanation in each of the steps for us to complete all the reports was explained by our coordinator, Mr Zullhyzrifee, with the guidance of our supervisor Mr Razli. We also attended the FYP 02 literature review writing workshop presented by Dr Parameswari A/P Shunmugam and Mrs Norhayati Binti Majid related to writing the final project report. This makes it easier for us to research and complete our braille game project report. In addition, our supervisors also taught and helped us get started in stages and ensured the braille game designs were well-produced and safe for the production process. Not to forget, the cooperation of each party plays a role in completing the task of this report. This shows that responsibility is significant, and we must keep it to ourselves. Finally, this practice also gives us some basic knowledge on making braille games so that these can benefit blind children in Malaysia.

5.2 Recommendations

This Braille Guide project, Fardu Ain, was recommended by our supervisor Mr. Razli and has the potential to achieve a level of effectiveness for special education students to gain deeper learning by using our braille design. Some unanswered questions were revealed in our efforts as students who created the design of this braille game, such as what is the relationship between our cooperation as students, not the government and the school to which we will give our Braille. Nevertheless, the implementation process of this braille game is very reasonable to conclude that we as students who created this Jawi braille game want our work to be presented with the function of use, product design or model, and combination of wood and other materials as well. good material if it can be seen in public. What made us as students work so hard to create this braille game? This is because this braille game allows visually impaired children to have a braille mentor to guide them through their learning. It has been proven to teachers and parents that this braille game is essential to the success of blind children in deepening their knowledge. Using Braille, moreover, Jawi designs are created. However, can we Malaysians influence the level of satisfaction of blind children in education?

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