

INTERNSHIP REPORT
AT PT. NUANSA PORCELAIN INDONESIA



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INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM
INDUSTRIAL TECHNOLOGY FACULTY
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3.	Tanggung jawab	95
4.	Kerjasama dengan rekan sekerja	90
5.	Sopan santun dan tata krama	95
6.	Daya tangkap dan pemahaman terhadap tugas yang diberikan	95
7.	Kemampuan melaksanakan dan menyelesaikan tugas	95
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Bojaleli, 12 Agustus 2017

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 (... Ok. Dan Wahyu W ...)

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Bahwa nama yang tersebut di atas telah melakukan aktivitas magang kerja diperusahaan kami PT Nuansa Porselen Indonesia terhitung mulai tanggal 4 Juli 2017 sampai dengan 12 Agustus 2017.

Saudara Juniver Alkasih Pesoa telah melaksanakan tugas dan tanggung jawab dengan baik selama kerja praktek di perusahaan kami. Yang bersangkutan juga aktif mempelajari dan mengikuti kegiatan desain dan produksi yang berlangsung di perusahaan kami.

Demikian surat keterangan diberikan dan agar dipergunakan sebagaimana mestinya.

Boyolali, 12 Agustus 2017



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The author concede that this Work Placement report is far from perfect therefore, comments and insights which can develop further this report are much appreciated. The author also hope this Work Placement report can be useful for other people who are interested on the subject.

Yogyakarta, December 8th 2017


Author

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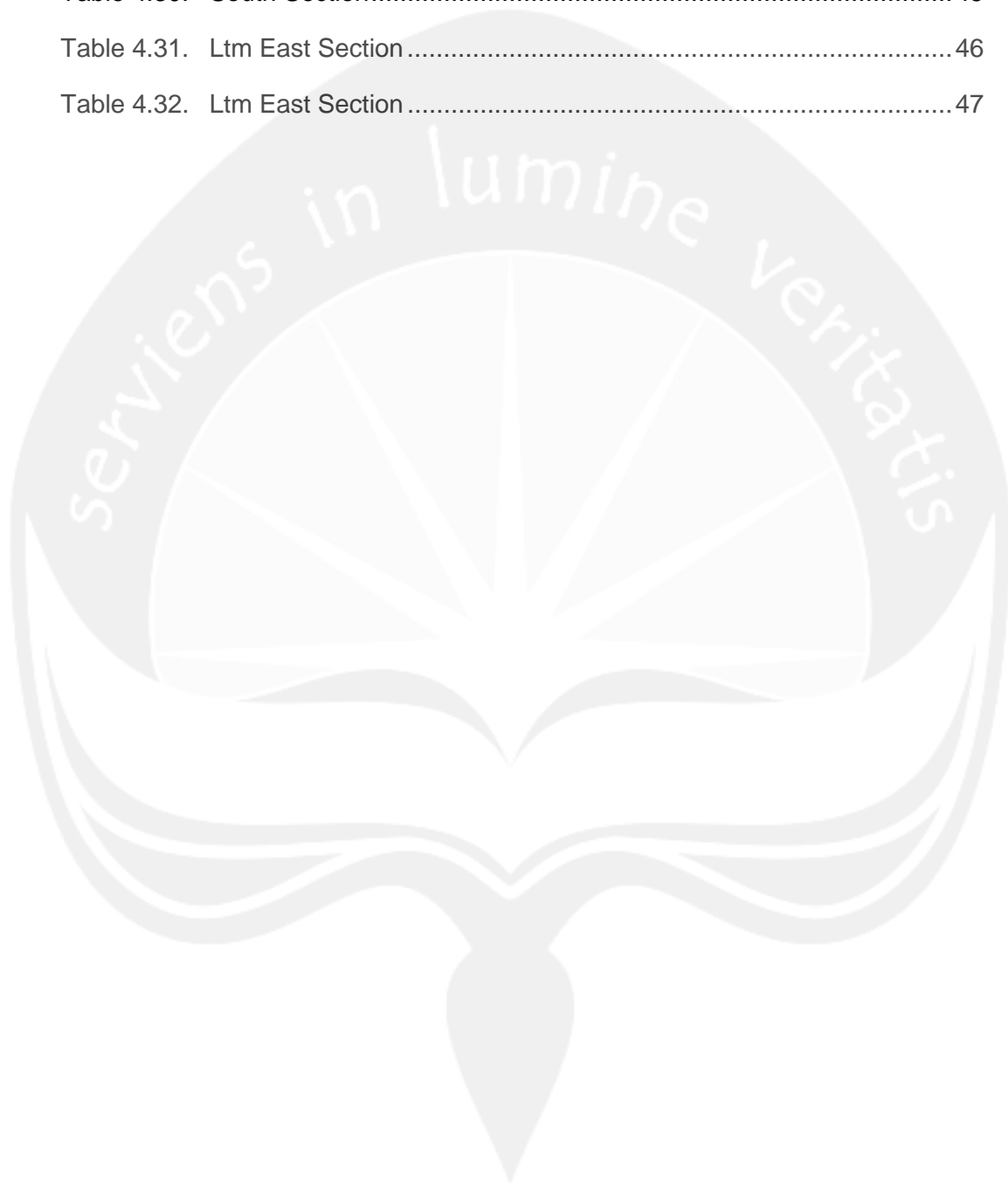
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CHAPTER 1

INTRODUCTION

In the preliminary chapter consists of 3 parts which is background, objectives, and work placement at PT. Nuansa Porselen Indonesia.

1.1. Background

Industrial Engineering Program of Atma Jaya University Yogyakarta (PSTI UAJY) have an obligation for all students to carry out of work placement in accordance with Curriculum in PSTI UAJY. The purpose is to introduce the atmosphere of industry and also to improve and develop work ethic as a candidate bachelor of Industrial Engineering.

Work placement can be said as a simulation event for student profession of industrial engineering. The paradigm that must be implanted is that during the work placement, students are work in the companies that they choose. Work, in this case includes the activity of planning, design, improvement, implementation and problem solving. Therefore the activity in work placement that undertaken by students are:

- a. Recognize the scope of the company
- b. Continuously following the work process in the company.
- c. Perform the task that assigned by supervisor, or field supervisor.
- d. Observe the system behavior
- e. Compile reports in written form
- f. Carry out the work placement exams

This work placement shall be carried out for at least 1 (one) month in the company which the students may choose individually as long as the company meets the requirements as a practice workplace that established by UAJY PSTI.

Industrial Engineering is a branch of engineering that deals with the planning, design, improvement, and installation of integrated systems comprising of human, machine, materials, information, energy, work methods and financial resources or briefly reviewing industrial system. From the curriculum in PSTI UAJY, the competence that owned by students and graduates of Industrial Engineering among others:

1. System Design work and Ergonomics
2. Production Planning and Control
3. Inventory / Inventory Management
4. Quality Control System
5. Material Handling System
6. Logistics and Supply Chain Management
7. Product Design and Development
8. Occupational Safety and Health Techniques
9. Design of Manufacturing Facility Layout
10. Organizational Management
11. Cost Analysis
12. Industry Feasibility Analysis
13. Process Design and CAD / CAM, and others.

In the implementation of work placement, the company expected to placement and assign tasks or jobs to students in accordance with the competence of Industrial Engineering.

1.2. Objective

Things to be achieved through the implementation of work placement is :

- a. Practicing self-discipline.
- b. Practicing ability to interact with subordinates, co-workers, and superior within the company.
- c. Practicing ability to adapt with the work environment.
- d. Observing directly the company's activity in producing and running the business.
- e. Completing theory that obtained in lectures with the actual situation in the factory.
- f. Enhance insight on production system and business system.

1.3. Location and Time of work placement Implementation includes Student Placement Area

Work placement held at PT. Nuansa Porselen Indonesia located in Dedegan Hamlet RT 03 / RW 05 Ngadirojo Village, Ampel Boyolali 57352. In this work placement, the author is placed in the Research and Development Department. This work placement held on July 4, 2017 – August 12, 2017. The hours entry for authors is

follow the non-shift working hours from 08.00 – 16.00 WIB. During this activity, author also guided by Mr. Ok Dwi Wahyu Widyanarka.



CHAPTER 2

COMPANY OVERVIEW

In this chapter will be explained about the company profile. This chapter consist of 3 sections: the company's short history, organizational structure, and company management.

2.1. Company's Short History

PT. Nuansa Porselen Indonesia has strated production since 2008. sudah mulai memproduksi sejak tahun 2008. In January 18, 2013 the factory is moved to Ampel Boyolali, Central Java. High quality ceramics and porcelain items are produced in this company. The produced items are Figurine, Tile, Tableware, and Trophy for local and export purposes.

PT. Nuansa Porselen Indonesia is a subsidiary of PT. Pearland Indonesia. The purpose of the establishment of PT. Nuansa Porselen Indonesia is to meet the needs of the local market because of PT. Pearland Indonesia only fullfill the needs of international market. However, nowadays PT. Nuanza Porselen Indonesia began to fullfill the needs of international market.



Picture 2.1. Logo PT. Nuansa Porselen Indonesia

Their products now are widely used in hotels, restaurant, resorts, mosques and so forth. Porcelain trophy products become one of the primarily product of PT. Nuansa Porselen Indonesia because almost all national and international golf championship use product from this company.

Human Resources owned by PT.Nuansa Porselen Indonesia is very complete, start from ceramic chemist who is experienced in handling some foreign ceramics factory in Indonesia, ISI Yogyakarta alumni designer who has full of experience and

supported by several production staff that have more than 20 years experience in the field of ceramic. .

PT. Nuansa Porselen Indonesia produces best quality porcelain with Indonesian cultural design. Figurine products are used by the President of Indonesia as a state souvenir, which has been given to heads of countries around the world including Barack Obama, Queen Elizabeth, Jordan, Putin, etc. Other products such as trophy are also widely used for international golf championship such as Indonesia Master and some of countries are starting to use Nuansa Porcelain trophy for example USA, Australia and Japan.

PT. Nuansa Porselen also produces tile and mosaic products that have been used in hotels, resorts and now are currently in the process working on the Al-Huda mosque in Jakarta. Where's this mosque are called by the observers as the best architectural mosque. In addition, Nuansa's tableware product has been trusted by a some of hotels, cafes and restaurants in Jakarta such as Tesate and Seribu Rasa for dinnerware in their restaurant. This company also has penetrated the international market by sending many tableware products to various countries such as Netherlands, USA, Canada, Japan, Taiwan, Singapore, Malaysia and Saudi Arabia.

2.2. Organizational Structure

Forming the organizational structure is done in accordance with the development of the company, so that formed clearly about the division of tasks, authority, and responsibility so that organization can run smoothly to achieve corporate goals. (Organizational Structure Attached)

The description of each task is as follows :

a. Chief / Leader / Directure

This is the highest organizational structure of the manufacturing company that oversees all positions. This position is responsible for all operational and the responsibilities as follows:

- i. Establish the company's policy lines.
- ii. Determining sales targets per year.
- iii. Have authority in handling financial problems, seek and manage the use of corporate funds for the smooth operation of the company.
- iv. Conduct monthly evaluations and oversee the operations of the company.

b. Production Manager

The head of production department has a difficult task to check all the products that has been produced. The task and responsibilities :

- i. Set the job time to match the delivery time.
- ii. Set the position of Quality Control at each point of work.
- iii. Providing production prices so that marketing can make a sale price.
- iv. Preparing the production plan, keeping the good quality of the products, and responsible for production activities for the smooth operation of the production system.
- v. Seeing the cleanliness, strength and weakness of the company's products compared to the competitors.
- vi. Controlling raw materials, supporting materials and others materials based on production planning.
- vii. Planning the purchase of raw materials, machine and others that related to productions activities and coordinate with the purchasing department

Head of Production Department supervises several section as follows:

a) PPIC (*Production Planning Inventory Control*)

PPIC's task is accept orders from sales (sales / marketing) and then make sure the order is completed and sent to the customer at the agreed time. Task and responsibilities:

- i. Provide an explanation of each order of goods to the Head of Production.
- ii. Follow up on weekly developments to Head of Production Department.

b) QC (*Quality Control*)

QC are examines the company's products and production processes to obtain the required quality standards. QC tasks include monitoring, testing and examining all production processes involved in the production of a product. Task and responsibilities:

- i. Check the goods in detail.
- ii. Provide instructions to repeat the work because it is not accordance with company quality standards.

c) Post production

This section consists of sub-section of packing and storage of finished goods.

c. *Finance & Accounting Manager*

Assigned to manage the company's finance, any matter related finances either in terms of production or expenditure and income will be the responsibility of the Finance Division. Task and responsibilities:

- i. Creating invoices.
- ii. Make proof of payment.
- iii. Manage the funds needed during production activities.

Head of Finance & Accounting Department supervises several sections as follows:

a) *Accounting Departemen*

Have on task as financial control by recording all transactions in and out. All transactions will be recorded and reported to the President Director. Task and responsibilities:

- i. Calculates costs incurred over a period.
- ii. Calculates Amortizational and Depreciation of Company Assets.
- iii. Perform stock opname at the end of production period.

b) *Cost & Budget Departemen*

Task and responsibilities:

- i. Calculates costs incurred over a period.
- ii. Calculates the production result
- iii. Estimates the funds needed during one periode.

c) *Tax*

The task is to calculate and perform corporate tax obligation.

d. *Marketing Departemen*

Marketing have a task to offering products to customers as well as explaining everythings that related to the product to customers then receiving orders from customers. Task and responsibilities:

- i. Follow up order from customers.
- ii. Processing orders from customers.
- iii. Planning and organize all marketing activities and result sales of production.
- iv. Ensure that sales volume keeps increasing.
- v. Introducing new products.
- vi. Responsible for reporting marketing activities.

e. *Purchasing Manager*

The task and responsibilities is to directly control and coordinate activities on routine and non-routine purchases and supervise the entry of purchased goods used for the production process from the warehouse.

Purchasing Manager oversees the following section:

a) Purchasing Dept (*Purchasing*)

Task and responsibilities:

- i. Collect data from each section about needs of the goods.
- ii. Conduct cross check with the warehouse dept about the stock of goods.
- iii. Make a purchase order for the goods to be purchased.
- iv. Make a routine and non-routine purchase.

b) Warehouse Dept

- i. Make a report receipt of goods.
- ii. Conduct cross check with the purchasing dept about the stock of goods.
- iii. Creating reports in and out of goods from the warehouse.

f. *HR & GA Manager*

Has responsible for any personalia rules or general service and recruitment process and promotion / mutation.

Head of HR & GA Department supervises several sections as follows:

a) *H & R Departemen*

Task and responsibilities:

- i. Organize the employees by placing in according the expertise.
- ii. Checking the completeness of the administration requirement of applicant.
- iii. Make the qualification test.
- iv. Conduct an interviews.
- v. Coordinate with DISNAKERTRANS.
- vi. Entering / preparing complete data of new employees.
- vii. Make contract extension agreement.
- viii. Preparing / making attendance.
- ix. Report attendance data to the superior and submitted to the payroll section.
- x. Creating an employee's permit, coaching, warning, layoffs, etc.
- xi. Creating / preparing warning letters.
- xii. Creating and prepare a promotion or mutation letter.

b) *GA Departemen*

Task and responsibilities:

- i. Conducting all permissions required by the company.
- ii. Maintain good relations with the surrounding environment with local government.
- iii. Recording and reporting company assets, ensures the availability of office needs.

c) *Maintenance*

Task and responsibilities:

- i. Conducting maintenance and repair of office facilities.
- ii. Maintaining the durability of the tool or machine used to perform the production process.
- iii. Responsible if there is a production equipment that run into damage or disruption.

g. *Internal Auditor*

Task and responsibilities:

- i. Perform a process of internal audit and reporting in the form of audit report.
- ii. Running the company's internal audit process in technically and periodically in financial or operational terms.
- iii. Checking the company's financial.
- iv. Analyze accurately and can provide an overview of financial settlement issues.

2.3. Management Company

In this section will explain how PT. Nuansa Porselen Indonesia managing the company. Management that conducted are started from labor, marketing, until processing existing waste. In this sub-section is divided into 4 sections are vision and mission company, employment, waste processing system and marketing of products.

2.3.1. Vision dan Mission of the Company

Every company must to have a vision and mission as guideline for the development of the company, as well as PT. Nuansa Porselen Indonesia who has vision and mission as follows:

a. Vision

Brings the beauty of Indonesian culture.

b. Mission

Being a provider of ceramics and porselen product that made by Indonesian people.

c. The values in the company

- i. Honesty and sincerity.
- ii. To be responsible.
- iii. Initiative.
- iv. The spirit of work together.

2.3.2. Labor Management System

a. Human Resources

Human resources is one factor that is very important even can not be separated from an organization, both institutions and companies. HR is also the key that determines the development of the company. In essence, human HR is employed in an organization as a driver, thinker and planner to achieve the organization's goals. And PT. Nuansa Porselen Indonesia has 115 employees.

b. Employee Recruitment

Before someone is accepted in PT. Nuansa Porselen Indonesia as an employee, the prospective employees must follow the company's specified recruitment procedures. Here is the phase of recruitment of PT. Nuanza Porselen Indonesia, which are:

- i. Selection phase through incoming letter of application.
- ii. The calling phase of the prospective employee.
- iii. Interview stage with the desired Human Resource and Department.
- iv. Final interview with Human Resource.

c. Working Hours

Working hours of PT.Nuansa Porselen Indonesia as follows:

- i. Working days : Monday - Saturday
- ii. Holidays : Sunday – National Holidays
- iii. Working hours :
 - 1) Monday - Thursday : 08.00 – 16.30 WIB
 - Break 1 : 09.30 – 09.45 WIB
 - Break 2 : 12.00 – 13.00 WIB

2) Hari Jumat	: 07.30 – 17.00 WIB
Break 1	: 09.30 – 09.45 WIB
Break 2	: 11.30 – 13.00 WIB

PT. Nuanza Porselen Indonesia also applied overtime hours when a production process has not completed its production target when it is close to due date. But if normal conditions do not need an overtime hours. Because of the ceramic burning process for approximately 1 day and the process requires precise temperature accuracy then PT. Nuanza Porselen Indonesia has an employee who specializes in keeping the furnace up until night

d. Salary System

Salary system at PT. Nuanza Porselen Indonesia is paid once a month at the beginning of the month. The remuneration is paid by ATM from each employee. The amount of remuneration value is based on the type of work, employee ability and educational background of the employee. For public workers such as night watchmen, cleaners are at least elementary school graduates. For machine operators at least SMK machining graduates. For production operators at least graduate SMA / SMK . And for staff at least D3 graduates.

e. Employee Facility

PT. Nuanza Porselen Indonesia also provide some of facilities for the employees, such as:

i. Safety tools

To implement the health and safety system, PT. Nuanza Porselen Indonesia provides safety equipment that employees use when working such as gloves, masks and aprons.

ii. Canteen

The canteen sells a wide variety of food and drink at an affordable price. And the seller is a resident around the location factory.

iii. Drink

PT. Nuanza Porselen Indonesia provides free drinking for employees to freshen the body during work. The drink is available at the dispenser at some point of the production floor.

iv. Toilet

Toilets are located near the production floor. The facilities are water tap, scoop and soap.

v. Parking Space

Most of PT Nuanza Poselen Indonesia employees bring personal vehicles while working. Then the company provides two-wheeled or four-wheeled parking lot at the front of the factory.

vi. Health Insurance (through BPJS)

Health insurance for employees is provided by enrolling each employee into the employment BPJS program.

vii. Holiday Allowance

Holiday allowance is given once a year before Idul Fitri and is given no later than 7 days before the holiday.

viii. Mosque

This mosque facility is given to Muslim employees to fulfill their religious duties.

2.3.3. Waste Processing System

Waste is the remainder of a process that has no added value but has a negative impact on the environment and must be handled in order not to endanger the environment. A manufacturer must identify the waste generated in order to know what the waste is causing. After identifying, then tackling the waste into something useful or useless but it does not have a negative impact on the environment. Waste generated at PT. Nuansa Porselen Indonesia is solid waste and liquid waste. Waste treatment is done on three tubs with the filtration process so that the water that was mixed with the soil becomes more clear and good for the environment. The water can be used to mop up the floor. While solid waste from the soil is used to mix the building soil.

2.3.4. Pemasaran Produk

PT. Nuanza Porselen Indonesia cooperates with several entrepreneurs in Indonesia and abroad such as hotel businessmen, restaurants, art galleries, resorts, etc. The strategies implemented by PT. Nuanza Porselen Indonesia in marketing its products are as follows:

- i. Website, the products of PT. Nuanza Porselen Indonesia can be found on the website of PT. Nuanza Porselen Indonesia.

- ii. Promotion, promotion product of PT. Nuanza Porselen Indonesia is done y giving advertisement and discount price.
- iii. Exhibition, PT. Nuanza Porselen Indonesia always participating in exhibitions in Indonesia because the products can quickly known by public. Some exhibits that have been followed by PT. Nuanza Porselen Indonesia are Jateng Fair, Solo Raya Creative Expo and INACRAFT.

2.3.5. Appreciation

PT. Nuansa Porselen Indonesia is often involved in some exhibition products and often get some awards, which are:

- i. Best service of Solo Raya Creative Expo 2014.
- ii. The best stand of Pameran Jateng Fair 2015.
- iii. Best Innovation Craft Jogja Internasional Furniture and Craft Fair Indonesia 2016.

CHAPTER 3

COMPANY OVERVIEW SYSTEMS

3.1. Business Process of the Company or Business Unit or Department

Business process can be defined as a collection of processes and contain a set of interrelated activities (tasks) to produce an output that supports the strategic objectives and goals of the organization. Business process of PT. Nuansa Porselen Indonesia generally shown in the picture 3.1.

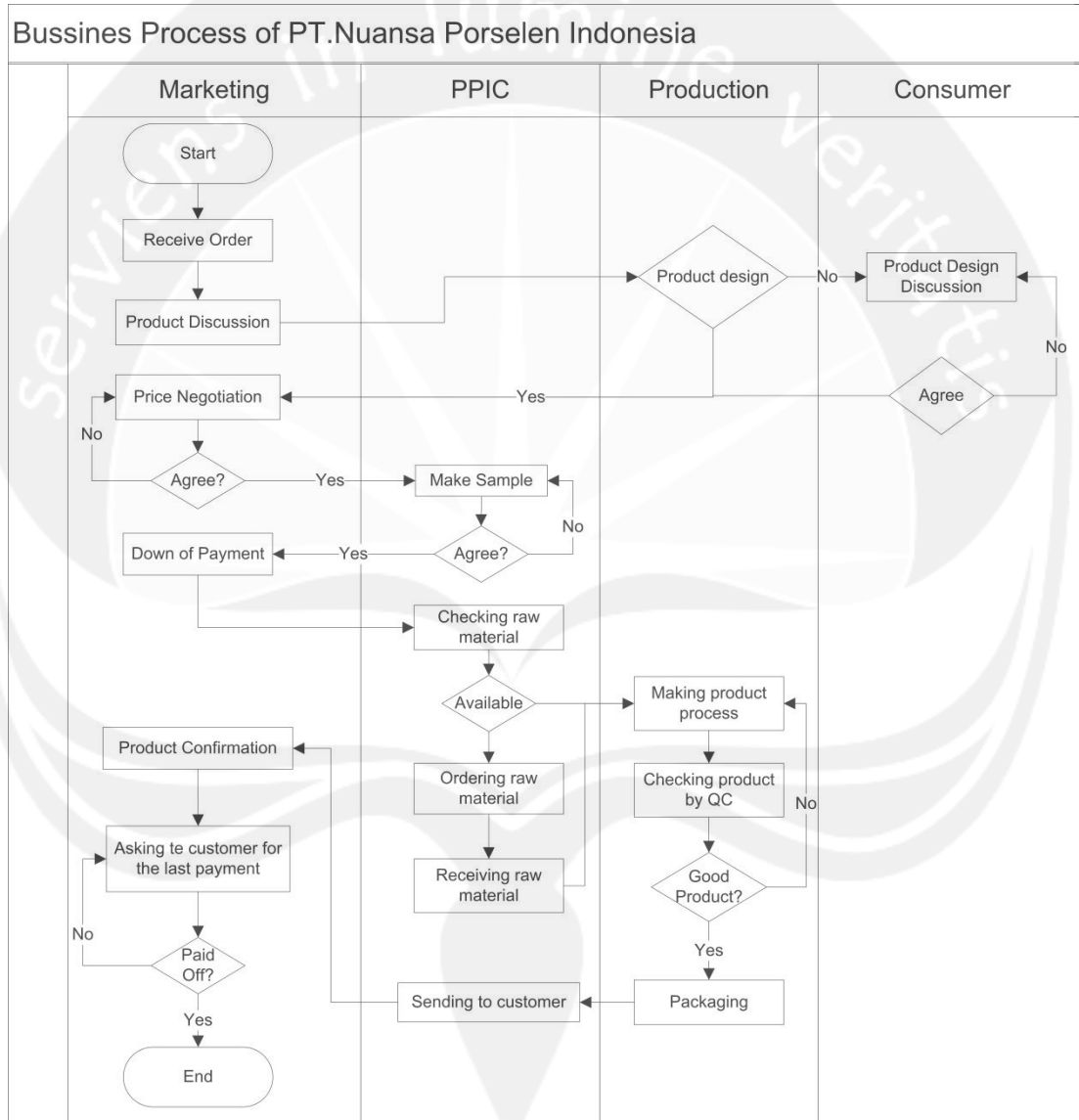


figure 3.1. Business Process of PT. Nuansa Porselen Indonesia

Based on the business process of PT. Nuanza Porselen Indonesia, departement that related are *Marketing, Production Planning Inventory Control, Production,* and

Consumer. The process begins with acceptance of orders from consumers by the Marketing department. The order process is continued by discussing the product design desired by the consumer. In the process of discussion of this product, consumers can choose products that have been provided by the company or can also create their own product design. Then the process of acceptance of product design on the production. If the desired product design is acceptable by production department then the next process is price negotiation by the marketing department, but if the product design can not be accepted then the discussion again with the consumer. Then if the consumer has agreed it will be negotiated price with the marketing but if consumers have not agreed then the discussion again. After negotiating the price, if the consumer agrees with the price given then the sample will be made by the PPIC section, especially the design section, but if the consumer does not agree with the price given then the price negotiation will conducted again. Then the sample created by the design section will be shown to the consumer, can be sent or the consumer comes to the company. When the consumer agrees with the samples made then the next process the consumer gives down payment on the marketing but if the sample is still not according to consumer desire then the design will make the sample again. After the sample process is complete, the PPIC checks the raw material inventory to be used, if the raw materials to be used are sufficient then the production part will immediately produce the order, if not enough then the raw material will order first. After the consumer order is completed, the product will be checked and inspected by the quality control section. Results of products that are matching with the standard will enter the packing process, while the products that are not matching with the standard will be separated and the production section immediately reproduce. After the packing process is complete, the marketing department will confirm the customer if the ordered product is ready to be shipped. Products close range will be sent using the car box, if the range is far enough place then the delivery is done by sending service. Then if the product has reached the hands of consumers, consumers will check whether the ordered product is suitable and qualified, because if there is a defective product (broken / cracked) during the send trip, then the company will replace it. If the product is qualified according to the consumer's desire then the marketing department will ask for the last payment. Then the business process is complete.

3.2. Produced Item

There are 2 types material that PT. Nuansa Porselen Indonesia used, which is *stoneware* dan porselen. Consumer can choose the material that will use.

i. *Stoneware*

Stoneware commonly called as soil ceramic. To burning it's need high temperature around 1000° - 1280° *Celsius*. Stoneware products usually coated of glaze before entering the combustion process. This glaze layer will provide attractive colors on ceramic products. Because it is burned in high temperatures, the content of Silica (Si) on the soil will melt covered the entire surface of the object with a thin layer of glass. Silica is a glass-making material. This thin glass coating makes the surface of the ceramic has water-resistant.

ii. Porselen

is a ceramic material made by heating materials, generally including kaolin, in a kiln to temperatures between 1,200 and 1,400 °C (2,200 and 2,600 °F). The toughness, strength, and translucence of porcelain, relative to other types of pottery, arises mainly from vitrification and the formation of the mineral mullite within the body at these high temperatures.

Porcelain slowly evolved in China and was finally achieved (depending on the definition used) at some point about 2,000 and 1,200 years ago, then slowly spread to other East Asian countries, and finally Europe and the rest of the world. Its manufacturing process is more demanding than that of earthenware and stoneware, the two other main types of pottery, and it has usually been regarded as the most prestigious type of pottery for its delicacy, strength, and its white colour. It combines well with both glazes and paint, and can be modelled very well, allowing a huge range of decorative treatments in tablewares, vessels and figurines. It also has many uses in technology and industry.

3.2.1. Product Category

PT. Nuansa Porselen Indonesia has several category product.

i. *Figurine*

Figurine has several variant product, such as sculpture, keluarga kudas, penari Bali, Arca, Buddha, Angel. Etc.

ii. *Tile*

Tile product ceramic usually arranged as mosaic in various shapes and sizes. This product is used on wall and floor.

iii. *Tableware*

Tableware is the dishes or dishware used for setting a table, serving food and dining. It includes cutlery, glassware, serving dishes and other useful items for practical as well as decorative purposes. Example product of PT.Nuansa Porselen Indonesia are plates, bowls, cups, teapots, etc.

iv. *Trophy*

Trophy that produced by PT. Nuanza Porselen Indonesia commonly used for golf championship souvenirs.

Product of PT.Nuansa Porselen Indonesia such as:



Picture 3.2. Figurine Product of Keluarga Kudus



Picture 3.3. *Figurine* Bride Product



Picture 3.4. *Figurine* Dancer Product



Picture 3.5. Figurine animal product



Picture 3.6. Tableware product



Picture 3.7. Tableware Teapot Product



Picture 3.8. Tableware Plate Product



Picture 3.9. tableware cup product



Picture 3.10. Champion Trophy Product



Picture 3.11. Tile Product



Picture 3.12. Tile for Floor / Wall Product

3.3. Production Process

Production Process is a series activities to create product with a technique to transformed raw material into finished product. These process usually involve some prossess such as, assembly, material handling, inspection, and packaging

Production process flow of PT. Nuanza Porselen Indonesia show on picture 3.13.

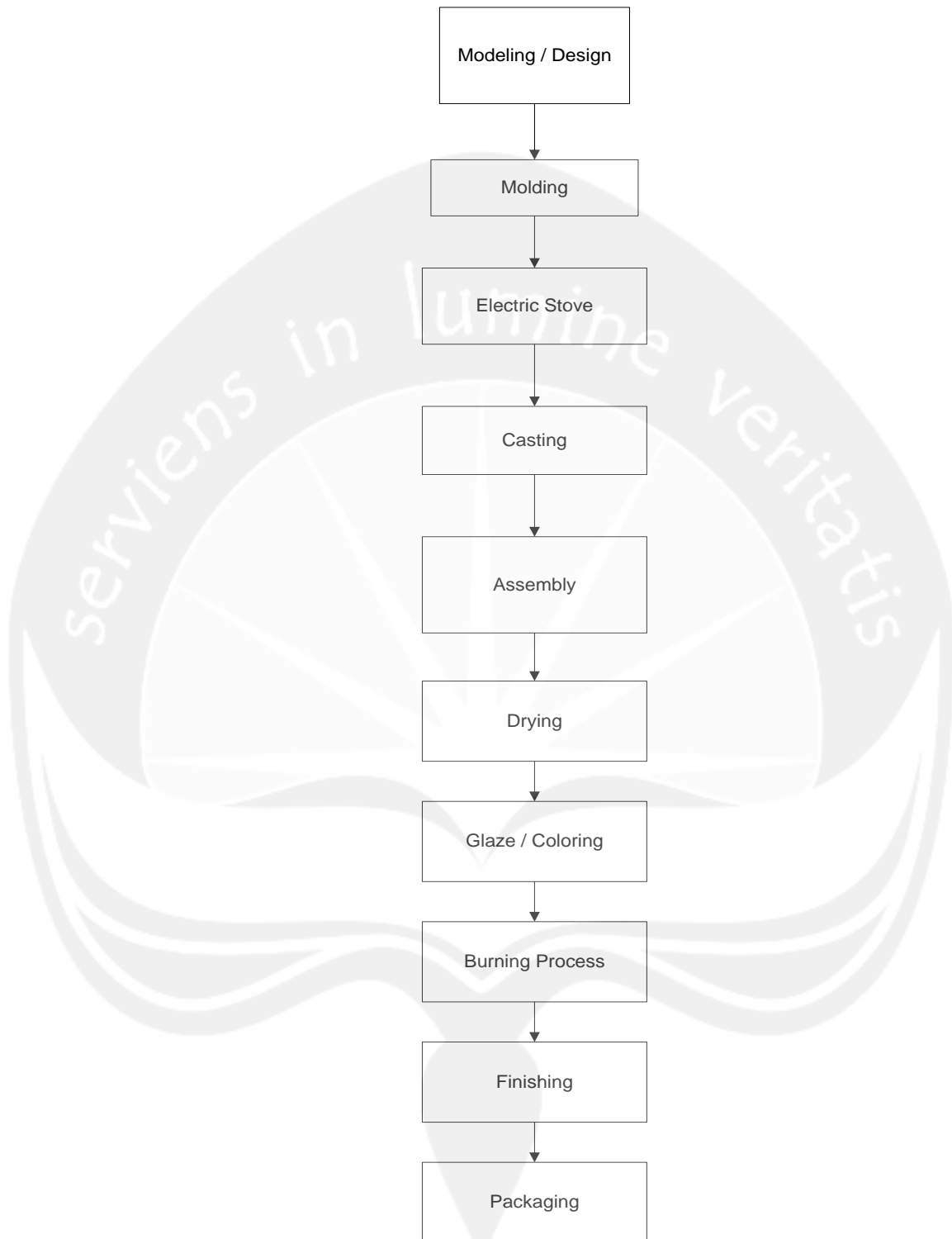


Figure 3.13. Flow of Production Process PT. Nuanza Porselen Indonesia

The production process of porcelain and stoneware begins with the design / modeling process. This design process will make a master product to be produced. Making the design can be in accordance with consumers desire, for example consumers have brought the design of photos / pictures or in the real product. Also consumers directly can choose products that are already provided by PT. Nuanza Porselen Indonesia. When consumers bring their own designs, designer also makes the same model with different design variations, so that consumers can choose which model is preferred.

Master model size is 15% more than the actual size, because during drying and burning process, the product will shrink 15%. If the model is not made in accordance with the consumers want, then the designer needs to revise the design. The next process is molding. To make a mold, used doll / master that has passed the design process. Preparation of mold using gypsum and water materials with a ratio of 40: 60. First, gypsum and water mixed with a mixer machine so that become dough molds. Then make a mold based on doll / master, and it will burning about 4 hours with an electric oven to harden and have a good absorption.

The next step is casting process. Soil material mixed with water using mixer machine. After the dough is finished in mixing, the dough is poured into the container box and then taken to the casting department using hand truck. Comparison of the raw material is 1 : 1. After casting, the dough is waited for ± 5 minutes to be absorbed by the mold wall and dry out. When it is dried, the dough is removed from the mold using high pressure air. The results of the casting are still slightly wet then smoothed or assembled (assemblies). For products that are hard to remove from the mold (undercut) will process separate, and later the separate parts will be assembled (assembly).

The next process is drying. The process is done by placed on the wheeled rack. This slow drying will have a good impact on the product results because it minimizes product defects such as cracks on the surface. When the product is dry then the next step is painting process. For products that need no coloring they directly go to the burning process. Painting process can be done manually by the operator or can also be done with the glaze process through spraying.

After the painting process is complete, then will enter the burning process. This burning process uses a closed stove. The preparation of the product on the stove

and the use of temperature will affect the product results when burned. The stove door must be closed properly to avoid product defect and to prevent the stove from exploding. PT. Nuansa Porselen Indonesia has 2 stoves and they use LPG gas fuel (Liquified Potroleum Gas). Upon exiting the burning process, the products enter the finishing process. The finishing process includes inspection, refinement and cleaning process. The quality control section will check whether there is a unqualified product. unqualified products include cracked, broken, overcooked.. After inspection, some products such as tile, sculptures are smoothed with sandpaper. Then the entire surface is cleaned with a cloth. Next the product enters the packing process. The product is wrapped in a plastic and then put into cardboard.

3.4. Production Facilities

Production facilities in PT. Nuanza Porselen Indonesia as follow:

a. Board tray

The board tray is used to move products that have been out of the casting process. This tray is made of thick plywood boards so that it can withstand loads quite a lot.



Picture 3.14. Tray

b. *Hand truck*

Hand truck used to move the material using box, sack or container box. The capacity of hand truck is 150 kg.



Picture 3.15. Hand truck

c. Stacking rack

This stacking rack is used to put a board tray containing products that ready to assembly, burn, packing, painting and glaze. Almost every department has stacking rack



Picture 3.16. Stacking rack

d. Mixer machine

There are 2 of mixer machines. One machine is used to make stoneware or porcelain dough. Sukabumi soil and porcelain will make the dough with water so it becomes soft texture. The second is used to make a mold.



Picture 3.17. Mixer machine

e. Burning stove

Stove is used for the burning process. This stove use LPG (Liquified Potroleum Gas) fuel. There are 2 stoves at PT. Nuanza Porselen Indonesia, big stove and small stove. A large stove can accommodate ± 20000 pcs, while the small stove can accommodate ± 10000 pcs.



Picture 3.18. Burning Stove

f. Plastic Container

Plastic container used to put the soil dough after leaving the mixing process. Plastic container containing dough will be carried by hand truck. In addition, plastic containers are also used for products that are ready to be packaging.



Picture 3.19. Container plastic

g. Alumunium kettle

Kettle is used to poured out the dough into a mold.



Picture 3.20. Alumunium kettle

CHAPTER 4

REVIEW OF STUDENT OCCUPATIONS

4.1. Scope of Work

The implementation of practice work at PT. Nuansa Porselen Indonesia, the author is placed in the Department of Research and development especially the Design dept section, under the supervision of Mr. Oka. The company provides opportunities for work placement students to learn the process of making ceramics, and the design process.

4.2. Responsibility and Authority

During conducting work placement at PT. Nuansa Porselen Indonesia especially in the dept. Design, the author is given responsibility and authority as a participant of the work placement in the company.

Here are the responsibilities that author must to do :

- a. Learn and understand the making process of ceramic from start until finish.
- b. Learn how to make a product manually.
- c. Contribute in design process for big project.
- d. Make new inovation and design.

After author learn and observ the Design section, there are some problem that faced by this Section. Author are expected to help in problem solving and giving sugestions for Design section.

The Authority of author during work placement in PT. Nuansa Porselen Indonesia are:

- a. Author can use office facilities such as computer desks and rooms to do Al-Huda Mosque and make a reports.
- b. Author is allowed to get production process information from all workers and the existing operators.
- c. Author can take any data in accordance with the needs of the completeness of work placement reports.
- d. Author is allowed enter the production floor and take any important info that related to the production process especially for the design process.

4.3. Work Implementation Methodology

Assignment given to the author is to observe and assist in design process of PT. Nuansa Porselen Indonesia project. And also create new innovations or new design. The flow of problem solving faced can be seen in the following flow chart.

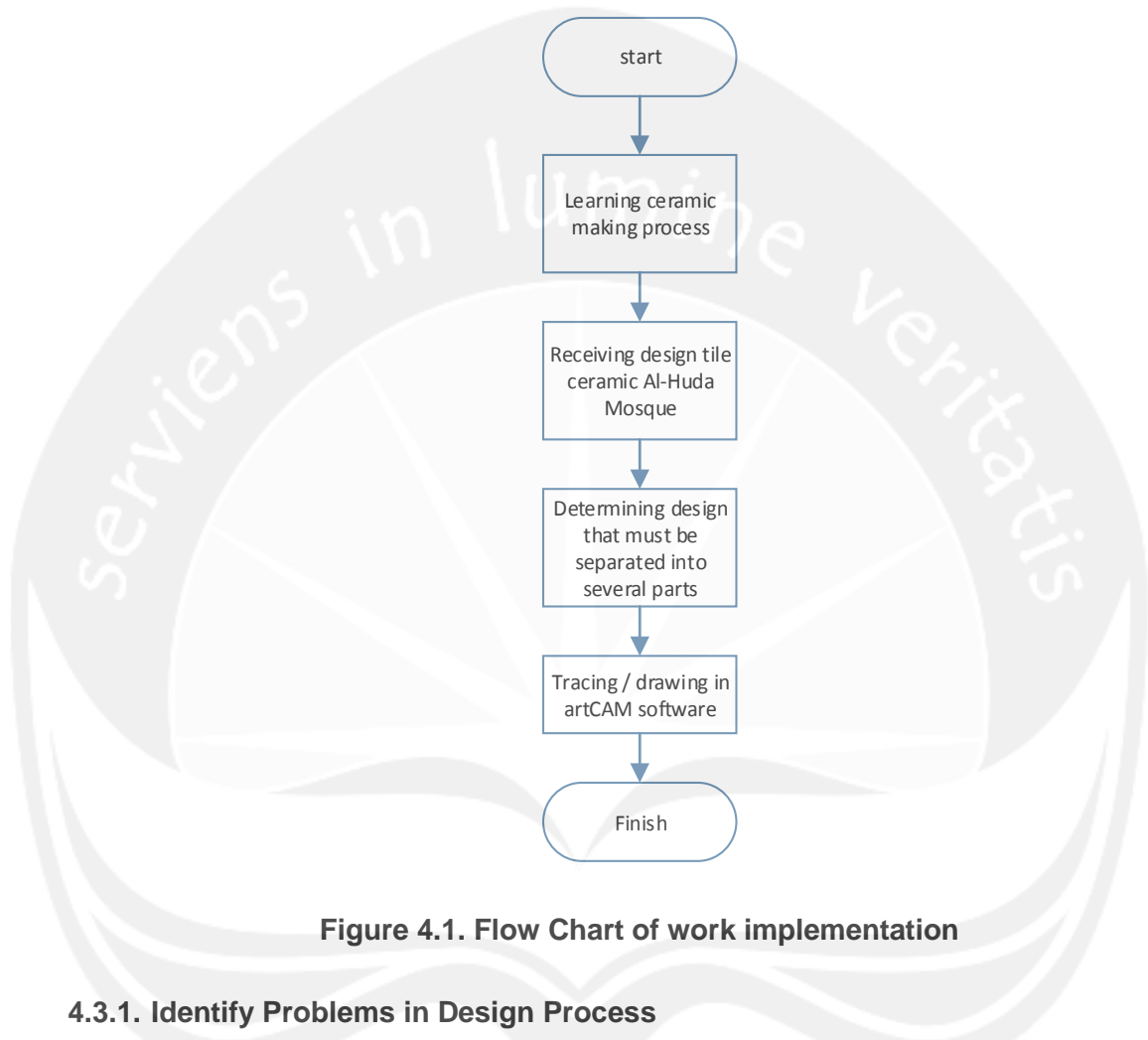


Figure 4.1. Flow Chart of work implementation

4.3.1. Identify Problems in Design Process

In the making process ceramic of PT Nuansa Porselen Indonesia has a Design section to make a model or master of the real product and in the next step is making core cavity based on the master. To make the master product, Design section still use conventional method or manual. Which means that master product are created by hand made. Tools that the employes use are simple tools, for example Ruler, Paper (A4), pencil, chisel, carving knife, soft brush, scissors and others. The tools shown on picture 4.2.



Picture 4.2. Design Tools

Depand on the product that customer request, model that would be create can be directly by using clay or can be drawn by a mal on paper. Shown on picture 4.3



(a)



(b)

Picture 4.3. 2D Model (a) , Proses 3D Model making (b)

To make a model 3D product, designer using chisel and carving knife to make the 3D model by the clay. The example product is figurine, Tableware, and trophy.



(a)



(b)

Picture 4.4. 2D Model (a) , Process Design on paper (b)

Modeling Process is used to create 2,5D product. For example is tile ceramic. The designer using Pencils, scissor, Ruler to drawing the 2D model on the paper. This process are important to get the specific shape, size, and others. Show on picture 4.4.

There is a request from Jakarta architecture to make interior product of Al-Huda Jakarta mosque which is tille product. The design already put up by architecture from

Jakarta. Based on the product, process design making will be done like *picture 4.4*. In this Process, author are assigned to help Design section in process design of Al-Huda request. Mosque Building has 4 section, which are north, east, south, and west section that must to be design.

Design process that will use is create the design on a paper. The process as a follow:

The first step is drawing the design on a paper (A4). But in this case, the design already put up by architecture from Jakarta in .CDR format (Corel Draw), therefore designer just print out the design on a paper (A4). Because this product has large size, therefore it will separated into several parts. Shown on picture 4.5.



(a)



(b)

Picture 4.5. Drawing & Cutting (a) , Separated Design (b)

The second step is to get the basic shape of product using gypsum based on the separated design. The separated design will stick on gypsum, then designer will tracing it use pencil. Shown on picture 4.6.



Picture 4.6. Stick in Gypsum

The third step, after gained the basic shape of product, then the designer will cut the material using cutter machine. Shown on picture 4.7



Picture 4.7. Cutting material

after cutting material is done, then the next step is to get the relief from the separated design. Gypsum will be moistened by a water, and then the paper (Separated design) will be stuck on the gypsum. Because of the water, the ink on paper will move to gypsum.

The fourth step is, after the relief has been gained, then the last process is to make the 2,5D design by shaving the following line on gypsum using a chisel, carving knife, soft brush as manual ways. Shown on picture 4.8.



Picture 4.8. Shaving Gypsum

After the author observed and learned about this process, there are some problems that are not appropriate. The problems are, this process design spends a lot of time, and it will cause production delay. Because the worker will manually draw first on the paper. After that, the worker will cut and separate into several parts using scissors. Design that has been cut will be stuck on a material of gypsum, then the worker will cut it using a cutter machine, the paper will be stuck again on the wet gypsum. Sometimes when the designer sticks the paper on wet gypsum, the ink will not be precise with the corresponding master 2D, and this will cause a lot of time to be fixed. And the final step is the designer will shave the material by following the tracing line. Gypsum material is so hard, then this cutting and shaving activity will cause injury and fatigue of the hand to the worker and also spend a lot of time. The other problem faced by PT.Nuansa Porselen Indonesia is, precision in making an angle for the tile product. In the process of making the product the designer uses an angle of 90°. So sometimes when the worker releases the

mold, it can not open because it is locked at certain angles. Sometimes also the designer only guess to make the angle, therefore the final product is not as expected.

4.3.2. Proposed Changes

Based on the problem above, then author has several proposed changes :

First, in the statement above has been explain that, process design a model are using by hand or manual. Start from make and design in paper, cutting, untill shaving material. In this case using gloves are recomended. Gloves are important to protect hand from injury and fatigue, it aslo decrease damage that receive by the hand. Cutting and saving process must be use different glove. For cutting can be use thick glove, while shaving process can be use more thin glove. The gloves shown on picture 4.9.



Picture 4.9. Thick glove (a) , Thin Glove (b)

Second, the statement also mention that this design process causing production time is delay because the process design is still conventional method, and this also will causing customer demand is not met. To avoid it, author offer supports from Atma Jaya University which have technology to decrease the production time. This support are Human labor which means Designer engineering, and also technology that will use (machine, software). Atma Jaya has *CNC machine* to help in creating product more efficient and effective. *CNC machine* are helping in making prototype or master product. The machine shown on picture 4.10.



Picture 4.10. CNC Machine

To running this machine, definitely need some input. The input for this machine are create in several software which are, *ArtCAM*, *PowerSHAPE*, *PowerMill* and designer engineering from Atma Jaya University are able with this technology. That's why author offering supports from Atma Jaya University to PT. Nuansa Porselen Indonesia in problem solving. The software logo shown on picture 4.11.



(a)



(b)

Picture 4.11. Logo ArtCAM (a), PowerSHAPE software(b)

And to fixed the problem of making the angle, author used 10° to process the 2.5D model tile product. because from brainstorming result with creative team, the mold can be opened with at least 5° . Author used 10° because some parts of the design has small size.

4.4. Assignment Result

Assignment that given to author are to assist designer engineering of PT. Nuansa Porselen Indonesia in Design Section, also give proposed changes if there are problem that faced. Author are help design section to design the product using technology from Atma Jaya University.

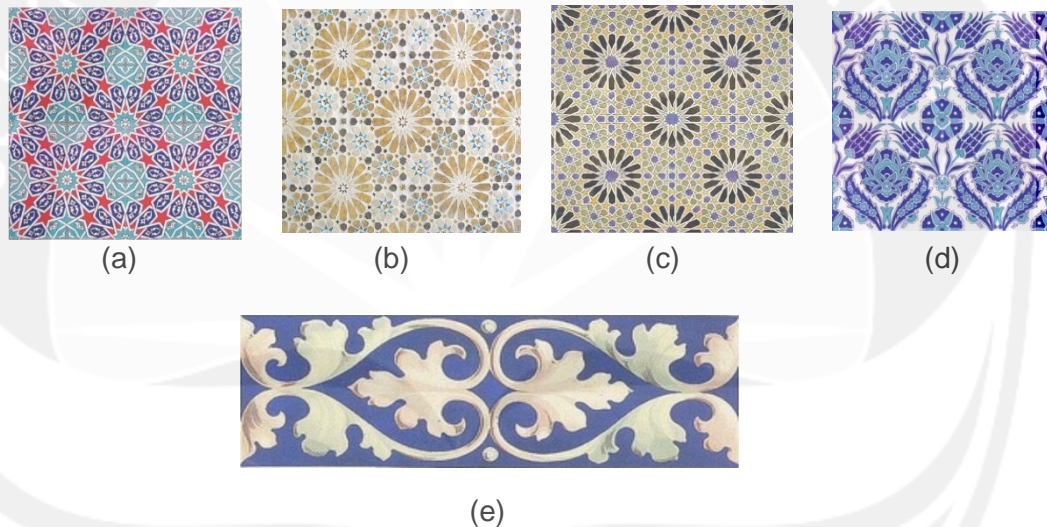
Author realize the product that will create should has an touches of art, because this product will be used as Interior of Al-Huda Mosque in Jakarta. In this case, as an Industrial Engineering in creating some product, author used the term of *Engineering Arts*. It means in creating product, there is still touches of art but also not out of

context from Industrial engineering technique. Therefore, to design the product author use *ArtCAM 2013*. This software has capability to create a product with touches of arts based on Industrial Engineering technique, also the only one that has capability from design the product, machining simulation, making prototype, until making the fixed product.

In this sub chapter will be explained about using *ArtCAM 2013* in 2,5D design making. The steps as follows:

i. Preparing 2D Design product

The first step is preparing the 2D Design Ornamen Islamic from Al-Huda Mosque that will be create. Al-Huda Mosque has four section, which is East, South, North, and west section. In this case, author receive 5 Design. The design shown on picture 4.12.



Picture 4.12. East section (a) , north section (b) , south section A (c) , south section B (d), ltm east section (e)

Before the 2D design inputted to the *ArtCAM* software, the parts that have to separated must be determined first. There are some purpose of separated design. First is, the CNC machine do not have enough space cause the product has the large size. second is, product with large size, has a high probability of cracking. Third, because there is limitation of burning plate in PT. Nuansa Porselen Indonesia. The burning plate size only 35cm x 35cm.

Brainstorming process is conduct with supervisor to determine the separated design, and it can be done manually by using print out on a paper, then sketch manually using pencil. Shown on picture 4.13.

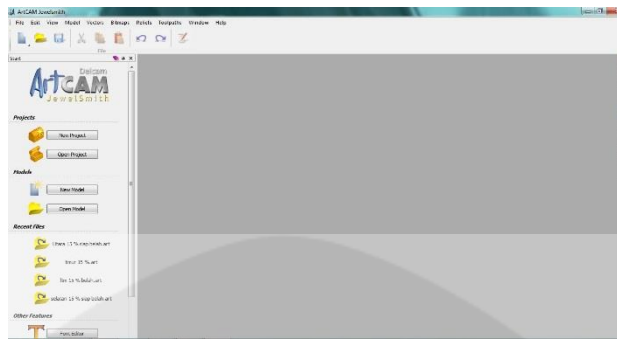


Picture 4.13. Parts Sketch

East, north, and south section has three parts, while ltm east section has six parts. There are three steps to determine the amounts of parts. First is identify the repetition shape. Second, determine the forming components based on the repetition shape. Whether the repetition can be formed alone or not. If not then it should be combined with other shapes. Shape with under 4 cm cannot be formed alone because it's too small. Third, after determine the forming components, next is measure each size of it. If the size is large than 35 cm, then it must be separated again into several repetition shape.

ii. Preparing *ArtCAM 2013* Software

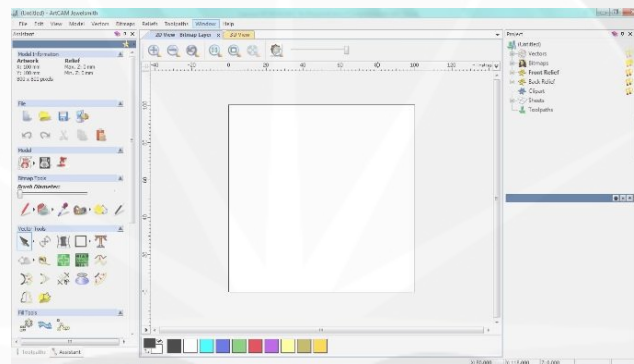
To using *ArtCAM* software, licence (dongle) is required. After the licence is conected to computer, then open the *ArtCAM 2013*. Author is use east section as an example to create 2D vector, until make the 2,5D Design relief. Shown on picture 4.14



Picture 4.14. Beginning view of ArtCAM 2013

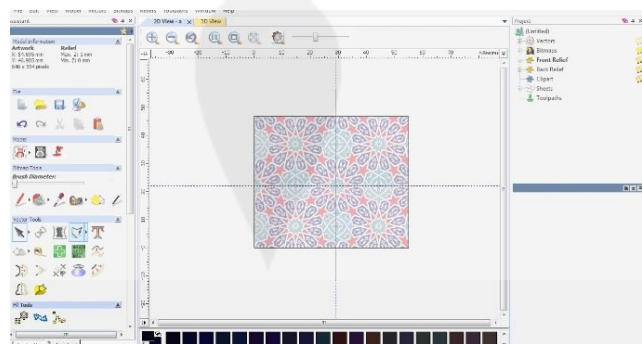
iii. Input 2D Design

Data 2D design should be in format *.jpg*. to input 2D design, first is click New Model features. Then the beginning view will be change into new model worksheet. Shown on picture 4.15.




Picture 4.15. New model worksheet

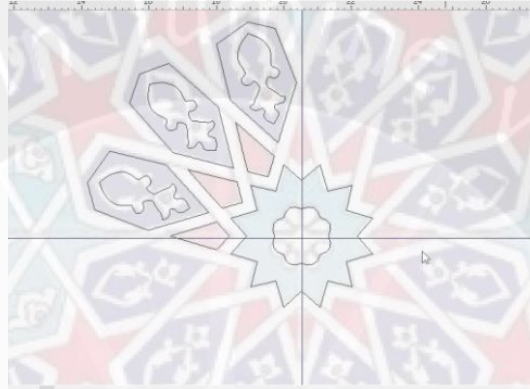
After the worksheet is ready, then click *File – Open* or can be drag and drop directly the 2D design into worksheet. Before start to draw, first is make a references Line in horizontal and vertical. The fungtion as central point, and assist in mirror object process. Shown on picture 4.16.



Picture 4.16. 2D design with references line

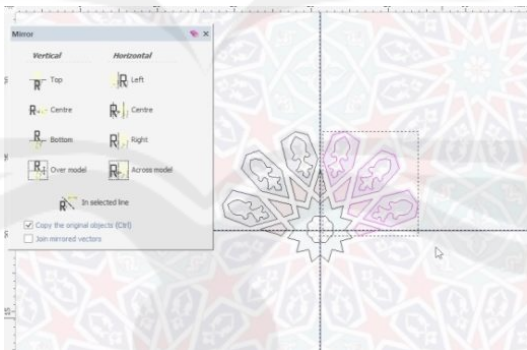
iv. Create Vector

Vector line are used to create the contour of the 2D design. This is useful for making 2,5D. In *ArtCAM* software, the tools to create vector line are *polyline*, *circle*, *rectangle*. Besides that, the other tools that will be used are *fillet vector*, *trim vector*, and *mirror object*. The drawn process using *polylin* (), then tracing the shape of 2D design that will be process to 2,5D design. shown on picture 4.17



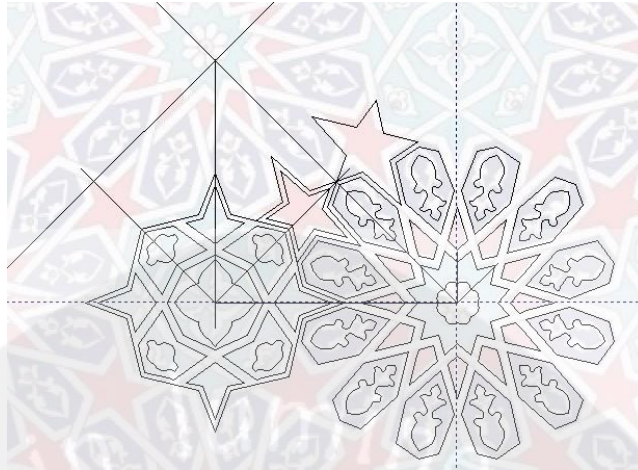
Picture 4.17. Tracing vector

To gain the precision design of repetition shape, author use *mirror object* tools on design framework that have been create and references line. Shown on picture 4.18.



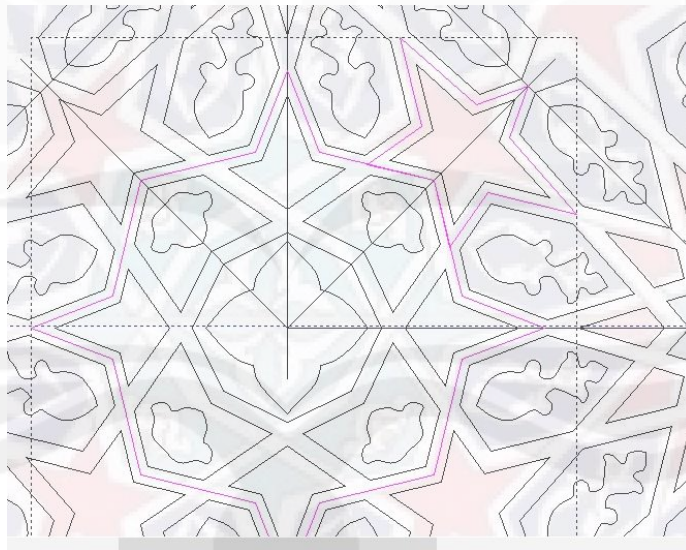
Picture 4.18. Mirror object

By applying *vector tools* then formed 2D vector design tiles. Because this tile product is repetition type, Then one forming components is enough to represent the other similar forming components. Shown on picture 4.19.



Picture 4.19. 2D vector of forming components

After gained the 2D vector, then the next step is create a dividing line between one forming component with others using *polyline* and also using the others forming component to make the precision of dividing line. The purpose as edge line of forming component and also as the based of product. Shown on picture 4.20







Picture 4.20. Edge line

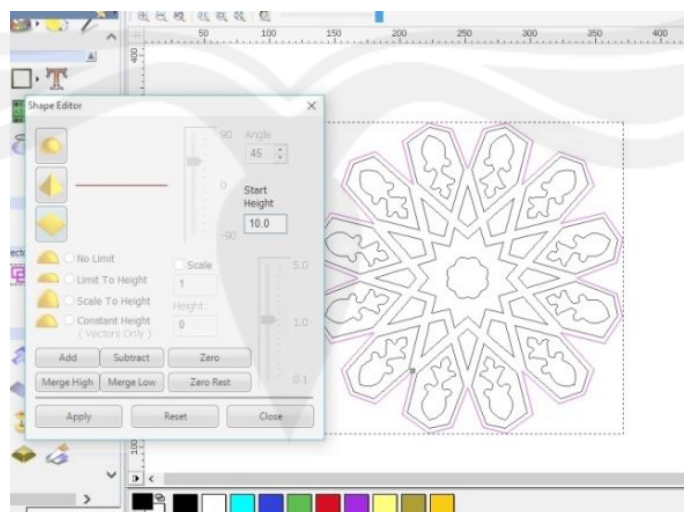
Next is separating the forming component by press *shift* button on keyboard and choose the forming component, then click *ctrl – x* on keyboard. Open the new model worksheet, *ctrl – v* on keyboard. This must be done because, the product is puzzle type, therefore to create the 2,5D model, each forming components must be separated in other model worksheet. Shown on picture 4.21.



Picture 4.21. Separated forming componen

v. 2,5D Design Model Process

After 2D vector is formed, then the next stage is making 2.5D design with artcam software. High low and large angle on the 2.5D model gives a big influence on the process of making ceramic molds. The problem faced by PT.Nuansa is, precision in making angle for tile product. Therefore in the process of making 2.5D model the researcher used 10° of angle. There are several features on *relief tools* to create 2.5D design depan on the model that will create. But in this process because the model has simple relief the author just use *shape editor* (), *Reset relief* () , *add draft* () , and *create triangles mesh* (). To create 2,5D model, author choose vector that would be create, then click *icon shape editor* on the *relief tools*. The first vector that would be create is based vector (dividing line) with high 10 mm. Input 10 on the *Start Height* colom, then click *merge high*. Shown on picture 4.22 and picture 4.23.



Picture 4.22. 2,5D relief process making



Picture 4.23. 2,5D Result

In the *Shape editor* tool, there are three options to create the surface of product, first is *half circle*, the function is to create half circle in product surface. Second is *taper shape*, and third is *flat shape*. To see the result of 2,5D design, can be press *f3* on keyboard, and if want back to 2D design worksheet press *f2*. Shown on picture 4.24.



(a)



(b)



(c)

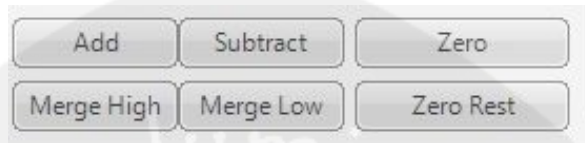
Picture 4.24. half circle (a) , taper shape (b) , flat shape (c)

After the based vector have been create, then continue with other 2D vector with the same way to create based vector, for example the smallest part. Choose all of the similar shape vector, click *shape editor* tools, input the height, then click *add*. To see the result, press *f3* on the keyboard. Do the same thing for others vector. Shown on picture 4.25.




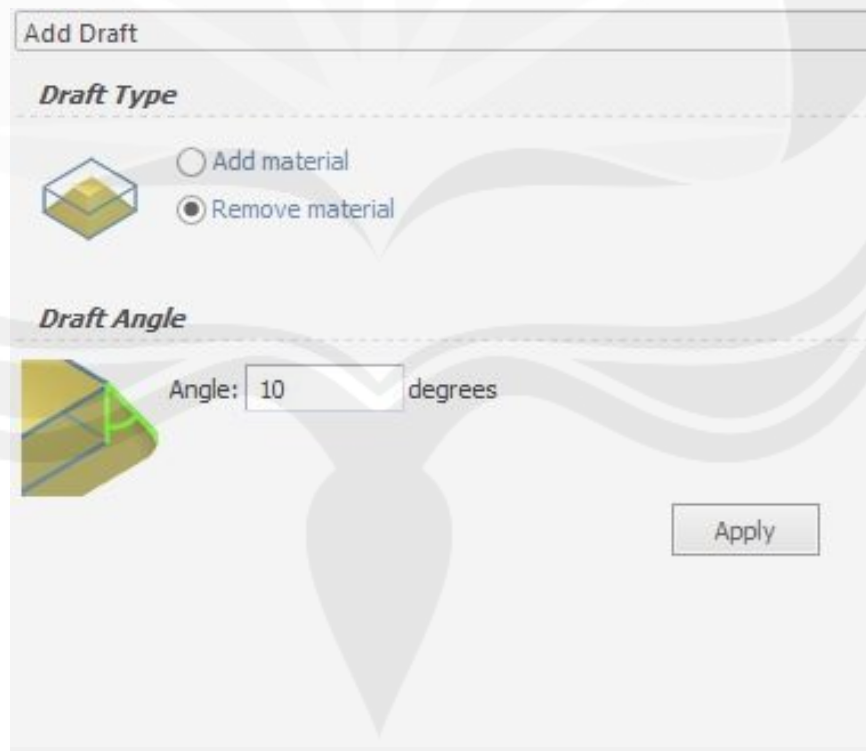
Picture 4.25. 2,5D small vector shape

There are six option of the direction relief in *shape editor* tool, which are *add*, *subtract*, *zero*, *merge high*, *merge low*, *zero rest*. In this process author just use, *add* to make a relief based on the highest of existing relief, *merge low* to make the relief down (-), *merge high* to make the relief up (+). Shown on picture 4.26.



Picture 4.26. Direction relief option

The next step after create 2,5D relief is make a angle 10°. Choose all of the vector that will make an angle, click *add draft* () – *remove material*, and input 10 in *draft angle* colom. *Add draft* has two types which are *add material* and *remove material*. *Add material* is make an angle by adding material, and *remove material* is make and angle by remove the material. Shown on picture 4.27.



Picture 4.27. Add Draft

The other result of creating 2D Design vector until 2,5D design relief can be shown on Table 4.28 until table 4.32.

Table 4.28. East Section


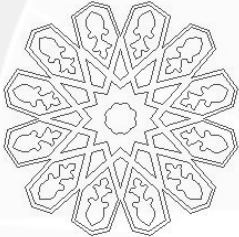





2D design vector	2,5D Design relief	Size
		
		<p>Width = 237,778 mm Height = 237,778 mm Base = 10= 11.5 mm Relief = 5 = 5.75 mm</p>
		<p>Width = 191.231 mm Height = 191.231 mm Base = 10= 11.5 mm Relief = 5 = 5.75 mm</p>
		<p>Width = 77.974 mm Height = 77.974 mm Base = 10= 11.5 mm Relief = 5 = 5.75 mm</p>

Table 4.29. North Section

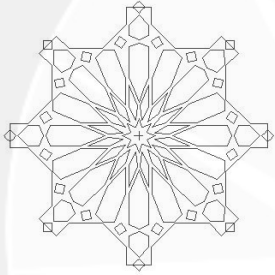
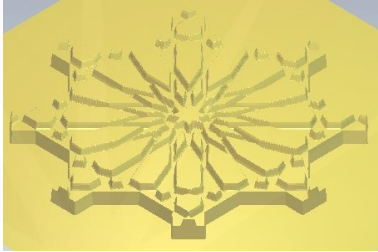
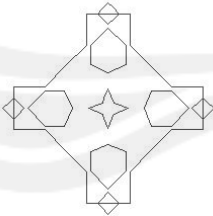

2D Design Vector	2,5D Design Relief	Size
		<p>Width = 212.872 mm Height = 212.872 mm Base = 8 = 9.2 mm Relief = 4 = 4.6 mm</p>
		<p>Width = 93.786 mm Height = 93.786 mm Base = 8 = 9.2 mm Relief = 4 = 4.6 mm</p>

Table 4.30. South Section

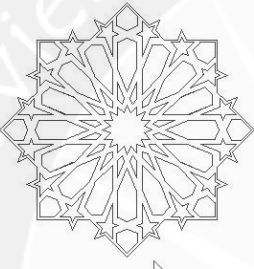

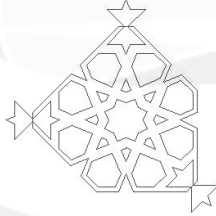

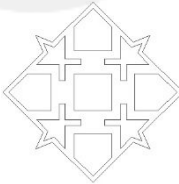

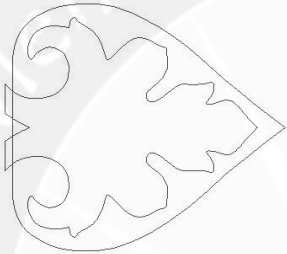

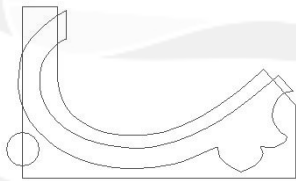

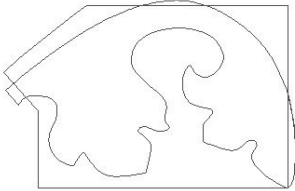

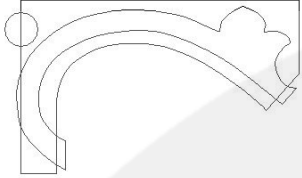

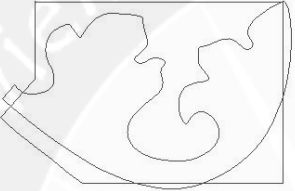

Vector	3D	Size
		<p>Width = 199.719 mm Height = 199.719 mm Base = 8 = 9.2 mm Relief = 4 = 4.6 mm</p>
		<p>Width = 97.446 mm Height = 97.446 mm Base = 8 = 9.2 mm Relief = 4 = 4.6 mm</p>
		<p>Width = 78.536 mm Height = 78.536 mm Base = 8 = 9.2 mm Relief = 4 = 4.6 mm</p>


Table 4.31. Ltm East Section

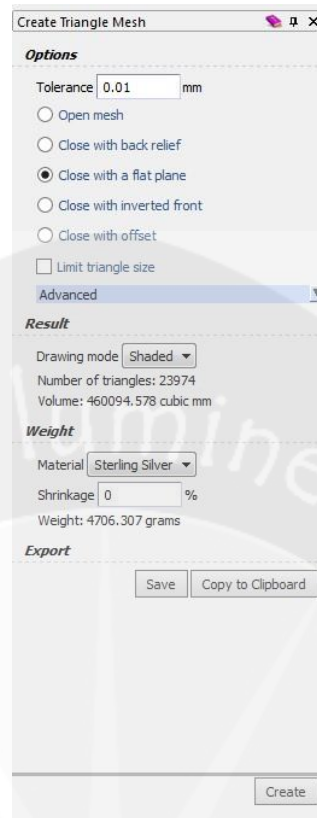
Vector	2,5D Design Relief	Size
		Width =224.75 mm Height=198.486 mm Base =10 = 11.6 mm Relief =5 = 5.75 mm H.Circle = 5°
		Width =223.011 mm Height=132.253 mm Base =10 = 11.6 mm Relief =5 = 5.75 mm H.Circle = 5°
		Width =211.448 mm Height=136.113 mm Base =10 = 11.6 mm Relief =5 = 5.75 mm H.Circle = 5°

Continue Table 4.32. Ltm East Section

2D Design Vector	2,5D Design Relief	Size
		Width =223.011 mm Height=132.253 mm Base =10 = 11.6 mm Relief =5 = 5.75 mm H.Circle = 5°
		Width =211.448 mm Height=136.113 mm Base =10 = 11.6 mm Relief =5 = 5.75 mm H.Circle = 5°

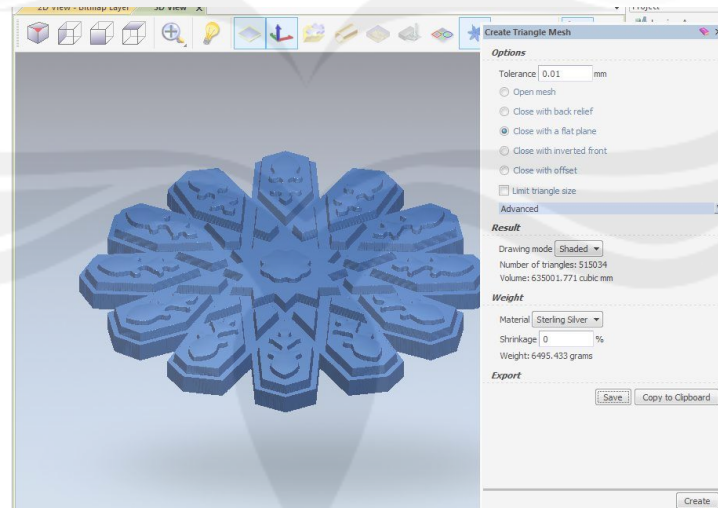
vi. Create *Triangle Mesh*

After 2,5D model relief has been done, next step is to save the file into *STL* format and then will be process with 3D Object 30 Pro machine to create the prototype or master product. The saving process will be save on by one 2,5D Design relief by click icon *create triangle mesh* () on the *relief tools*. Then the *dialog box* will be appear and choose *create*. Shown on picture 4.33.



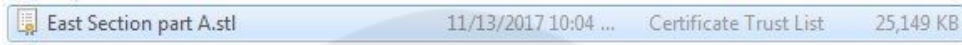
Picture 4.33. Create triangle mesh

When create process have been done, the product will be changed to blue color, it means that the saving and creating process are finish. Shown on picture 4.34.



Picture 4.34. Create triangle mesh result

From create triangle mesh process, author get data file of 2.5D design relief in form of *.STL* format. The file will be continue to design the tools setting in *PowerMILL* software by others team and ready to be machining process. Shown on picture 4.35.



Picture 4.35. STL file



CHAPTER 5

CONCLUSION AND SUGESTION

5.1. Conclusion

Based on the result of work placement activity, there are several conclusion:

1. PT. Nuansa Porselen Indonesia in design process using conventional method, and that is will causing production delay.
2. Cutting and Shaving activity will causing injury and fatigue to the hand's worker. Therefore, the worker must to use gloves to decrease damage that received.
3. There are 5 design that author received.
4. To decreased the production delay time, author are help in design process using technology from Universitas Atma Jaya Yogyakarta.
5. For east, north, and south section, has three parts of forming component, while ltm east section has six parts of forming component.
6. The final result of the design process is 2,5D design data in .STL format that ready to be setting for the cutting tools and machining process.

5.2. Sugestion

Based on the conclusion above, the sugestion is :

To complete the project of Al-Huda mosque, PT. Nuansa Porselen Indonesia should be collaborate with Universitas Atma Jaya Yogyakarta especially Department Production Process. Because there are alot design of Al-Huda Mosque from Jakarta.

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