INTERNSHIP REPORT

PT. MEGA ANDALAN PLASTIK INDUSTRI (MAPI)

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NPM : 15 14 08137

INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM

FACULTY OF INDUSTRIAL TECHNOLOGY

ATMA JAYA YOGYAKARTA UNIVERSITY

2018

APPROVAL

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The internship report which is written basen on the internship at PT. Mega Andalan Plastik Industri (MAPI) during the period from June 25, 2018 until July 28, 2018 by:

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Student ID	: 15 14 08137
Study Program	: International Industrial Engineering
Faculty	: Faculty of Industrial Technology

has been approved.

Yogyakarta, November 4, 2018

On Site Mentor	Faculty Supervisor
Andreas Adi Kurniawan	Luciana Triani Dewi, S.T., M.T.

CERTIFICATE OF INTERNSHIP

PT. MEGA ANDALAN PLASTIK INDUSTRI
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SURAT KETERANGAN

No.03/S-Ket/HRD/VII/18

Yang bertanda tangan dibawah ini, menerangkan bahwa :

Nama	: Bryant Sukoputra
NIM	: 151408137
Program Study	: Teknik Industri
Institusi	: Universitas Atma Jaya Yogyakarta

Telah Melaksanakan Kerja Praktek di Perusahaan kami, PT. Mega Andalan Plastik Industri yang bergerak dalam bidang plastik selama 1 (satu) bulan terhitung mulai tanggal 25 Juni 2018 sampai dengan 28 Juli 2018 dengan predikat Cukup/Baik/Memuaskan. * Lembar Penilaian Terlampir.

Demikian Surat keterangan ini dibuat untuk dapat dipergunakan sabagaimana mestinya.

Yogyakarta, 30 Juli 2018
PT. MAPI

Andreas Adi Kurniawan
General Manager

ACKNOWLEDGEMENT

First of all, thank God for his blessing and grace so that student was able to finish the Internship at PT. MAPI well and this Internship Report can be completed on time.

Internship is compulsory curriculum at Atma Jaya Yogyakarta University that has to be conducted in order recognize the industrial atmosphere to students as well as grow, improve and develop hard skill, soft skill as a candidate of Industrial Engineering candidate.

The completion of this Internship and Internship report was finished well because of the support, motivation and assistance from all parties that have participated. Therefore, student wants to gratitude to:

1. PT. Mega Andalan Plastik Industri (MAPI) as company that has accepted student to do Internship during the period.
2. Mr. Andreas Adi Kurniawan as manager of PT. MAPI and also student's field supervisor.
3. Mr. Gatot as Head of Production of PT. MAPI who participated in the finishing of student's project.
4. All employees or workers of PT. MAPI during the Internship has helped students in data collection and field observation in order to finish the project.
5. Deny Ratna Yuniartha, S.T., M.T. as the Internship supervisor of University of Atma Jaya Yogyakarta.
6. Luciana Triani Dewi, S.T., M.T. as student's academic supervisor and advisor, for her support and suggestions during student's project and report writing.
7. Paulus Damasus Dwi Putranto as student's colleague during the Internship who always support and motivate student.
8. Beloved mom that always supports student anytime.
9. All parties that have supported and helped in finishing the Internship and report writing.

Yogyakarta, October 28th 2018

Bryant Sukoputra

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INTRODUCTION

1.1. Background

Industrial Engineering Program, Faculty of Industrial Technology, University of Atma Jaya Yogyakarta (PSTI UAJY) requires all students to carry out Internship in accordance with Curriculum in PSTI UAJY. The UAJY PSTI sees practical work as a mode or means for students to recognize the atmosphere in the industry as well as grow, improve, and develop a professional work ethic as a candidate for Industrial Engineering graduate.

Internship can be said as a venue for the simulation of industrial engineering profession. The paradigm that must be invested is that during the practical work student's work in companies that they choose. Work, in this case includes the activities of planning, design, improvement, implementation and problem solving. Therefore, in Internship Practice activities undertaken by students are:

a. Recognize the scope of the company
b. Following the work process in the company continuously
c. Perform and do tasks assigned by boss, supervisor, or field supervisor
d. Observe system behavior
e. Compile reports in written form
f. Carry out the practical work exams

1.2. Aim

Things to be achieved through the implementation of this Internship are:

a. Practicing self-discipline.
b. Exercise ability to interact with subordinates, coworkers, and bosses within the company.
c. Train the ability to adapt to the work environment.
d. Directly observe the company's activities in producing and running a business.
e. Complete the theory acquired in lectures with existing practices in the company.
f. Add insight into production systems and business systems

1.3. Place and Time of Internship

This Internship was held in June 25th 2018 until July 28th 2018 at PT. Mega Andalan Plastik Industri (MAPI) which is located at Tirtomartani Street, Kalasan, Sleman, Special Region of Yogyakarta. In this Internship Practice, the student was given a project that had to be done. The student wasn't placed in any departement.

CHAPTER 2
COMPANY OVERVIEW

2.1. Brief Company History

The development of the plastic industry in Indonesia or in the international market is growing rapidly. The potential consumption of plastic products and packaging in Indonesia is also very large. PT Mega Andalan Kalasan collaborates with the plastic industry manager from Yogyakarta, Pakem, in 2015 built a subsidiary called PT Mega Andalan Plastik Industri (MAPI) in the Kalasan area of Yogyakarta with its full address on Cangkringan Street Km. 1 Dusun Dhuri, Tirtomartani, Kalasan, Sleman, Special Region of Yogyakarta, Indonesia. PT MAPI is located not far from its headquarters.

As one of the subsidiaries of PT Mega Andalan Kalasan, PT Mega Andalan Plastik Industri (MAPI) is committed to becoming a trusted plastic industry company in Indonesia that is able to become the pride of the Indonesian people. PT MAPI operates as a domestic plastic industry that promotes technological advances.

By continuing to process technology progress, PT MAPI currently has the latest technology plastic printing machines. The machines used at PT MAPI, are able to produce consistently, stable and fast. Currently, PT MAPI has 2 types of plastic packaging machines, namely inject system printers and blow-molding machines. With the capabilities that we already have, there are several products that have been widely circulated in the national market. There have been many companies that entrust their plastic packaging from PT MAPI, these products include: packaging bottles of fertilizer, vinegar bottles, jerry cans, vaccine bottles, cosmetic packaging, medicine spoons, jars, electric casing and many more

The need for plastic packaging from the design, shape, size, color, identity or logo of each company varies. PT MAPI provides solutions to beautify or give a different look to the packaging of your product in accordance with the demand and needs. Assisted by the Engineer and supported by trained and competent Human Resources, PT MAPI provides drawing services and plastic packaging solutions for products that are in line with the wishes. Stock inventory and distribution of PT MAPI products are scheduled precisely according to demand, and very competitive prices can be adjusted to the consumer budget. PT MAPI also has a complaint service regarding the quality of the product or other service that has been received

if it is not in accordance with the standard, so that the guaranteed product is received on time and quality. The example product of PT. MAPI such as Blue Bowl, Bottle of 15 ml LDPE Vaccine, Bottle of 10 ml LDPE Vaccine, HDPE Bottle 500 ml 60 gr, HDPE Bottle 1 liter 80 gr, Vinegar Bottle, 5 liter white Jerigen 210 grams.

2.2. Organizational Structure

The organtizational structure defines the organization's hierarchy of people and departement as well as how information flow within the organization. It is also the formal arrangement of roles, responsibilities and relationship within an organization.

The existing organizational structure of PT. MAPI can be seen in the figure below.

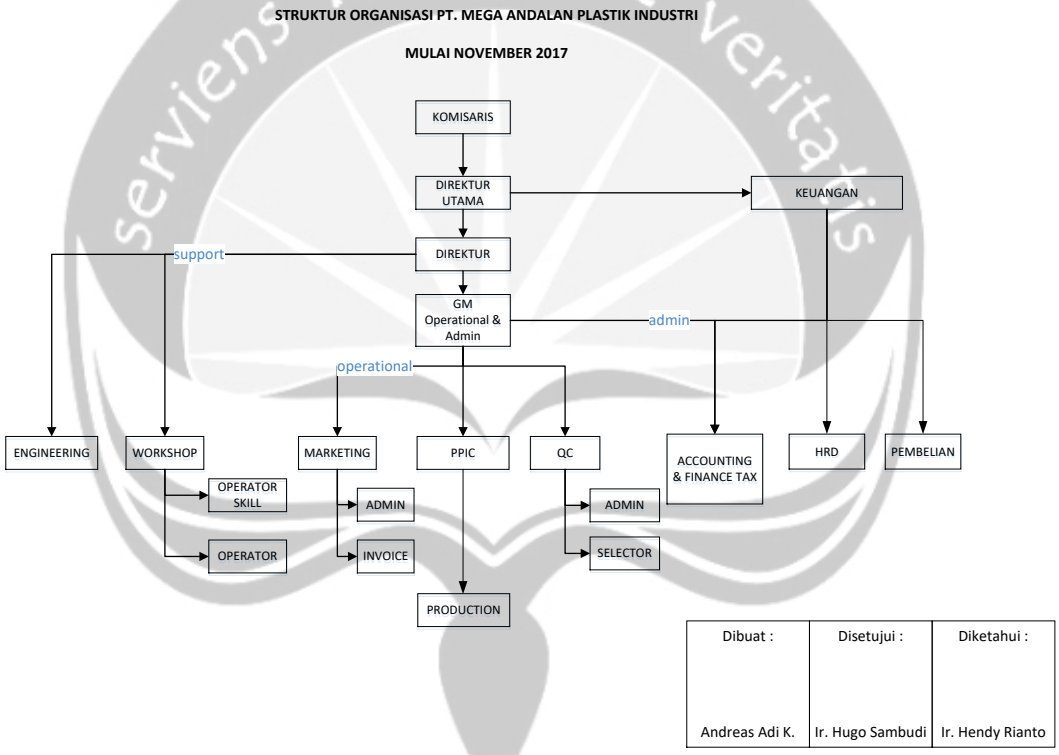


Figure 2.1. Main Organizational Structure of PT. MAPI

2.2.1. General Manager

a. Establish company policies by determining the company's plans and objectives both short and long term
b. Responsible inside and outside the company.
c. Coordinate and supervise tasks delegated to the other position and establish good working relationships.

d. Assisting the intern regulations to companies that do not conflict with company policy.
e. Improving and perfecting the arrangement aspects so that organizational goals can be achieved effectively and efficiently.
f. Become an intermediary in communicating ideas, ideas and strategies between leaders and staff.
g. Guiding subordinates and delegating tasks that can be carried out by subordinates clearly.

2.2.2. Engineering

a. Make mold design according to market demand.
b. Innovate and input to the customer regarding the delivery of design services that are in accordance with the wishes.
c. Coordinate with marketing and customers related to the design results of the images that have been made before proceeding to the mold making process.
d. Cooperating with the workshop section on the meaning of reading pictures in the mold making process.
e. Monitoring and coordinating with the mold making process, trial and mold trial results.

2.2.3. Workshop

a. Making and maintaining the mold that needed by the production department.
b. Maintenance of all components related to the mold, cleaning, and replacement of mold components.
c. Trial the new mold and make sure the molds installed on the machine can function properly.
d. Assist other people when there is a problem installing the mold on the machine and making sure the mold can be installed safely and functioning properly.
e. Order requests to the purchasing department regarding the need for materials needed in the workshop.
f. Responsible for the cleanliness of the workplace of the workshop, maintenance of work tools and machines and the safety of themselves and coworkers.

2.2.4. Marketing

a. Planning and compiling an integrated and efficient marketing strategy of production with regard to company resources.

b. Coordinating with the PPIC and Production Department to support the smooth production of work, including planning, processes and production results in the company.
c. Establish good relations and cooperation with consumers / customers.
d. Analyze reports on market conditions and situations along with competitor analysis.
e. Monitoring the smooth delivery of goods.
f. Responsible for the smoothness and implementation of marketing objectives in accordance with the established marketing strategies and objectives.

2.2.5. PPIC

a. Make a production planning both weekly, monthly or yearly based on data from Marketing, and coordinate with GM or Director for approval.
b. Coordinate with the HR department regarding HR needs that are adjusted to the production plan that has been made and approved.
c. Share work schedules with the Head of Production.
d. Coordinate the production plan that will be carried out to all relevant parts, so that there is preparation of facilities and infrastructure needed.
e. Collaborate with the Workshop section for needs that require Workshop section support.
f. Coordinate to the finance and purchasing departments related to production plans, as well as production needs that require a financial budget.
g. Cooperate with the company's engineering division if there is a plan to produce new products.
h. Coordinate with the QC department for established quality standards, or standardize quality, there is a balance between QC and production.
i. Evaluating the activities that have been carried out, drawing conclusions about the shortcomings that must be improved in the future and the successes that have been achieved in the production section that must be maintained.
j. Responsible for the suitability of the schedule to GM.
k. Responsible for work safety, both own self and coworkers.

2.2.6. QC

a. Coordinating with the purchasing department regarding the quality of the material needed.

b. Coordinating with the Warehouse section regarding the receipt of materials, the standard of quality checking that is set.
c. Control the process carried out in production and coordinate about the quality standards set in the company.
d. Supervise QC Inspector for random and periodic checks on products, visually, functionally and size.
e. Making a QC Pass or product marker sticker that passes the selection with the standard quality means that in the future it can be held accountable in the future if an error occurs in the control / damaged product.
f. Ensure that the products sent and received by the Buyer are products that are in accordance with the quality standards that have been set.

2.2.7. Accounting & Finance Tax

a. Creating a financial report both daily, weekly, monthly and or annually according to the needs of the company.
b. Make and report tax reports on income tax and value added tax.
c. Make tax planning and strategies in the company.
d. Provide analysis and predictions regarding the potential of corporate tax based on the applicable tax laws.
e. Apply accounting treatment for taxation events (starting from appraisal/calculation, recording (recognition) of tax.
f. Presenting accounting treatment in commercial reports and corporate fiscal reports.
g. Carrying out tax filing and documentation.
h. Looking for solutions to corporate taxation.

2.2.8. HRD

a. Managing the employee recruitment process by reviewing the needs of new employees and evaluating the results of the selection of prospective employees according to the requirements determined by the company in order to produce employees who are in accordance with the requirements and competencies required.
b. Managing, evaluating, and supervising the process of cooperation contracts with companies supplying labor, cleaning service, training, and transportation in accordance with the competencies and requirements set by the

Government and the Company, so that the interests of the company are protected.

c. Supervise the personnel data administration process, by managing attendance, payroll, benefits, and employee services, so that staffing data is neat, complete, and orderly administration.
d. Oversee the planning and implementation of employee training programs based on training needs according to the annual assessment results and job competency needs, to improve employee abilities / competencies according to needs.
e. Supervise and control the services provided to employees in terms of staffing, health, training and general processes in accordance with company regulations, so that employee rights are fulfilled.
f. Monitor and control the work plan and its implementation from the personnel administration process, training, clinics, and general sections, so that the interests of employees and companies can be fulfilled and smooth.
g. Maintain and enhance good relations with the community around the factory, government, police, military, and religious leaders by communicating the conditions and activities of the company, so that the situation and condition of the company remain safe and smooth.
h. Manage, evaluate, and supervise cooperation contracts with hospitals, clinics, health laboratories, and pharmacies in providing health services for employees and their families in accordance with company regulations, so that health services and their families are guaranteed, easy and fast, and reasonable costs .
i. Make monthly reports on staffing, training, health and general in accordance with procedures, to ensure the availability of accurate, informative and documented reports.
j. Motivate, develop, and evaluate the abilities and performance of subordinates, in order to be able to do work in accordance with job competencies and job descriptions

2.2.9. Purchasing

a. Planning purchases, coordinated with the production and marketing departments related to production and shipping plans, engineering department related to future project plans and other parts that require.

b. Make the Pre-Order to be submitted to the supervisor for review and approval about will need or no need for purchase.
c. Conduct market survey to check available price on the market.
d. Determine the supplier that is in accordance with the quality and price, and choose the supplier with the cheapest price and the most appropriate quality as needed.
e. Purchase goods by coordinating part of drivers and / or direct suppliers.
f. Carry out tracking or supervision of goods, so that will arrive at the company on time in accordance with the agreed time, to ensure a material vacuum and hamper the production process.
g. Recap of receipt of goods coming, confirm the financial part for the next financial process.
h. Coordinate with the warehouse section regarding the receipt report and also the report on the use of goods to adjust the amount of stock of admin records with real goods in the warehouse.
i. Responsible for ensuring the availability of materials and other auxiliary materials in the company's area.

2.3. Management of the Company

2.3.1. Vision and Mission

The Vision of PT. MAPI is “Being the Largest and Most Trusted Plastic Company in Indonesia That Can Become the Pride of the Indonesian Nation”.

The Mission of PT. MAPI is:

a. Always give QCD (Quality, Cost, and Delivery) which is the best quality, competitive cost and timely delivery for consumers.
b. Applying the 5R culture (Concise, Neat, Clean, Care, and Diligent) within the Company.

2.3.2. Employment

In PT. MAPI, number of employees are approximately 100 employees which is divided into several departments such as production, maintenance and office.

a. Recruitment

PT. MAPI employs approximately 100 workers. The employees are recruited by PT. MAPI as odd workers with contract per 3 months. PT. MAPI employees also is the residents that live on the company area. All of the employees are recruited directly but some are from the employee’s acquaintances. It means that, if an

employee has friends or family looking for job then they will suggest the company to recruit their friends or family.

b. Working Hours

Working hours in PT. MAPI is 24 hours starts from Monday to Saturday in a week. The employees have 1 day off in a week. The working day apply for only production employees. For the office employee's working day is only from Monday to Friday. The work shift is divided into 3 shift:

i. Shift 1: starts from 06.00 until 14.00
ii. Shift 2: starts from 14.00 until 22.00
iii. Shift 3: starts from 22.00 until 06.00

Break hours are self-managed by the employees themselves with duration of 1 hour.

c. Facilities

PT. MAPI also provide some facilities for the employees such as locker, mosque, parking yard for employee's motorcycle, and also kitchen which the employees will be served a tea, coffee and etc.

2.3.3. Marketing

The products of PT. MAPI are only marketed in local area. PT. MAPI focuses their products distribute to home industry and stores. Mostly, the products is distributed to home industry. The type of home industry is plant home industry which produces plant fertilizer. In addition, PT. MAPI also has regular customers so they will routinely distribute their products.

CHAPTER 3
REVIEW OF ENTERPRISE SYSTEM

3.1. Business Process of the Company

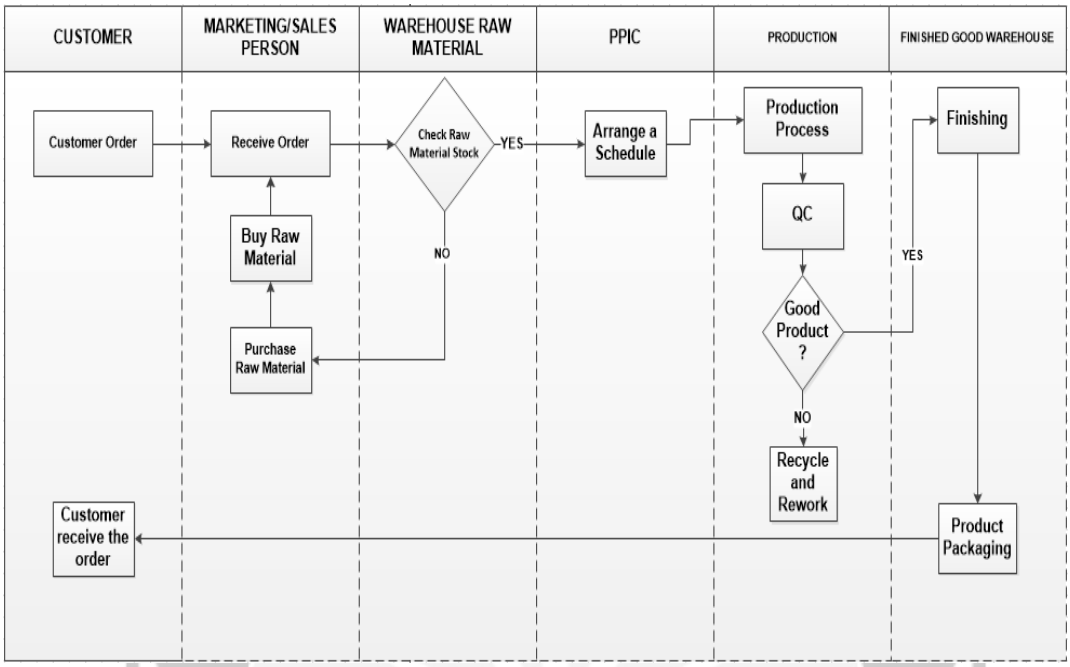


Figure 3.1. Business Process

This is the explanation of business proses of PT. MAPI (Mega Andalan Plastik Industri) :

a. Customer

The customer will make order to the company.

b. Marketing/sales person

Marketing/sales person will receive the order from the customer and will transferred to raw material warehouse department.

c. Warehouse Raw Material

In raw material warehouse, there will be stock checking to make sure that if the raw materials can fulfill the customer order. If the raw materials are not enough, then marketing department will contact supplier to buy and supply raw materials. If the raw materials that exist are enough to fulfill the customer order, then raw material department will transfer to PPIC department.

d. PPIC

The head of PPIC will arrange the schedule and other need regarding to the production process.

e. Production

After all has been passed in PPIC, the production process will start. When the production process is done, the final process is Quality Control to make sure the product is defect or not. If there is defect product, then it will reworked if it is possible, if it is not then it will be recycled to be a raw material again in crusher department. After all the products passed the QC, it will be sent to finishing which also the finished good warehouse.

f. Finished Good Warehouse

In finished good warehouse, the product will be packaged into a cartoon box and will be distribute to customer.

3.2. PT. MAPI Products

In PT. MAPI, the main product is from plastic and they produce many products but still has the same characteristics which are bottle, jerigen, jars, medicine spoon and many more. PT. MAPI products can be seen in Table 3.1.

Table 3.1. List of PT. MAPI Products

No.	Product	Type
1.	Vaccine Bottle	10 ml 15 ml 30 ml
2.	FMC Bottle	250 ml White 100 ml White 250 ml Brown 100 ml Brown
3.	Fertilizer Bottle	500 ml 1 liter
4.	Vinegar Bottle	80 ml 210 ml
5.	Medicine Spoon	
6.	Jerigen	2 liter 5 liter 210 gr 5 liter 185 gr
7.	Jerigen	5 liter
8.	Waste bottle	Single Type
9.	Jars	Single Type

Table 3.2. List of PT. MAPI Products Continue

No.	Product	Type
10.	Crystal Container	Single Type
11.	Legs of birds cage	Single Type

3.3. Production Process

PT. MAPI uses a continous production process. It means that the production process always run everyday because the type of production is mass production which produce in big amount. The production process flow can be seen in the Figure 3.1.

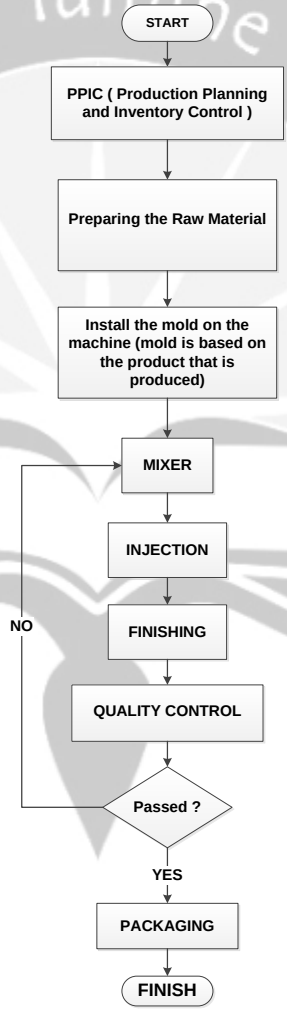


Figure 3.2. Production Process of PT. MAPI

The description of the production process in PT. MAPI**:**

a. Start

b. PPIC (Production Planning and Inventory Control)

Production Planning will set up the production scheduling. First, PT. MAPI will check the raw material whether the stock is still available or not. If the raw material is ready then they will make a schedule and then prepare the raw material for production.

c. Preparing the Raw Material

The preparation of the raw material will be put in a shelf which located in the raw material warehouse. The worker will take the raw material to production floor using stacker.

d. Install the mold on the machine

The workshop worker will prepare the mold and take the mold from the workshop place to the production area and will install the mold on the machine. The mold that is used will be based on the product that is produced on that time.

e. Mixer

In mixer process, the raw material will be mixed with a coloring material. This coloring material serves to give color to the product that will be processed. The color will be decided base on the customer demand or customer requirement.

f. Injection

In the Plastic Injection Molding Process there are 2 major parts of the method and type of machine used, namely: Vertical Injection Molding Machine and Horizontal Injection Molding Machine. In PT. MAPI, the machine used is a Vertical Plastic Molding Machine. This injection process includes 5 stages :

i. Mold Case
ii. Fill Injection
iii. Holding Injection
iv. Charging and Cooling
v. Mold Open

g. Finishing

At the finishing stage, the product that has been finished injected will immediately come out of from the machine after being removed or cut from the mold. The finished product will have a lot of scrap that is still united. The worker will cut the scrap that still mold with the product. The scrap will be gather into a sack and bring to the crusher department to be recycled as raw material again.

h. Quality Control

After the product is finished, the product checking process is carried out find out whether the product is feasible or out of defect. If there is a defect product, it will be gathered and bring to crusher department to be recycled as raw material again.

i. Packaging

The packaging in PT.MAPI uses a clear plastic to package the finish products. But some products will be put into boxes.

j. End

3.4. Production Facilities

In PT. MAPI production floor, there are a lot of facilities that the company provides and the worker can use. Below is the facilities of the production floor that the company provides :

a. Pallet

In PT. MAPI there are 2 types of pallet which consist of the steel pallet and the wood pallet. The steel pallet is use for the raw material that will be put before it will be processed, and the wood pallet is for the product that already been packaged. The size of the pallet in PT. MAPI is 1m x 1m. Below is the picture of the pallet that PT. MAPI use.

Figure 3.3. Steel Pallet

Figure 3.4. Wood Pallet

b. Shelve

Shelve is used to keep the raw materials, cardboard, scraps, finished good, and other tools to support the production such as the molds in the workshop area. Some of the Shelves in PT. MAPI have 2 untill 3 level but some only have 1 level. Below is the picture of the Shelves in the PT. MAPI.

Figure 3.5. 1 Level Shelves

c. Box Container

Box container is a box to keep the products as soon as the injection blowing finished. So when the products is done being injected there will be a small conveyor that will lead to the box container next to the machine.

Figure 3.6. Box Container

d. Trolley

Trolley is one of the Material Handling that PT. MAPI have in the production floor. The use of the trolley to help the worker bring Raw Materials and Finished Good.

Figure 3.7. Trolley

e. Stacker

Stacker is used to lift / bring down items that are on the shelf that has 2 or more levels. The stackers at PT. MAPI also have a functions to bring the mold from the workshop area to the injection machine. Because the weight of the mold is a little bit heavy so, the workers at PT. MAPI uses stacker.

Figure 3.8. Stacker

f. Crusher Machine

This crusher machine has a function to make the scraps of the finished good became a plastic seeds again. When the finished good has been finished, the scrap will put in a sack and then it will be put in the crusher departement. From the production process there are no waste, because all of the scrap will be recycled to be a raw material again.

Figure 3.9. Crusher Machine

Figure 3.10. Crusher Machine

g. Mixer Machine

Mixer machine is used to mix the plastic seed with colour material. The worker puts the raw material seeds and colour material into the tube, then the tube will spin.

Figure 3.11. Mixer Machine

h. Injection Machine

In PT. MAPI, there are fifteen injection machines. All of the machines are injection machines but the machines produce different shape or form of product. The machine usually is managed by maintenance team which the maintenance worker

will make the molding form or shape base on what will be produced. So, every machines produce different product. Injection machine that is used in PT. MAPI is Haitian Injection Molding Machine MA2500/1000G type. The machine specification can be seen in the figure below.

Specification

		MA 2500/1000G		
INJECTION UNIT		A	B	C
Screw Diameter	mm	50	55	60
Screw L /D Ratio	L/D	22	20	18.3
Shot Size (Theoretical)	cm^3	497	601	715
Injection Weight (PS)	g	452	547	651
Injection Rate	g/s	173	210	250
Injection Pressure	Mpa	205	169	142
Plasticizing Capacity(ps)	g/s	21.6	26.6	30.3
Screw Speed	rpm		0~180	
CLAMPING UNIT				
Clamp Tonnage	KN		2500	
Toggle Stroke	mm		540	
Space Between Tie Bars	mm		570X570	
Max.Mold Height	mm		570	
Min. Mold Height	mm		220	
Ejector Stroke	mm		140	
Ejector Tonnage	KN		62	
OTHERS				
Max. Pump Pressure	Mpa		16	
Pump Motor Power	Kw		22	
Heater Power	Kw		16.65	
Machine Dimension(L×W×H)	m		5.86X1.52X2.2	
Machine Weight	t		7.5	
Hopper Capacity	Kg		50	
Oil Tank Capacity	L		355	

Figure 3.12. Injection Machine Specification

Figure 3.13. Injection Machine

Figure 3.14. Injection Machine

Figure 3.15. Injection Machine

i. Raw Material

Raw Materials that used in PT. MAPI consists of two kinds of raw materials which are the plastic seeds HDPE type and coloring material. Coloring material is a kind material that give colour to the plastic seeds. This coloring process will be processed in the mixer machine. The color that will be used will depends on the customer requirement.

j. Steel stairs

PT. MAPI have 2 procedures to put the Raw Material into the injection machine. The first is the worker uses a small steel stairs to go up and pour the raw material

to the machine. The second way is PT. MAPI use a kind of pipe that sucks the raw material from it's sacks and then directly enter the machine to been process.

Figure 3.16. Steel Stair

Figure 3.17. Steel Stair

k. Printing

Printing process is used to print a stamp or writing on the product such as bottle and jars. This process is not main process in the production because it will be used when there is a request from the customer.

Figure 3.18. Printing Machine

CHAPTER 4
REVIEW OF STUDENT WORK

4.1. Scope of Work

During the Internship at PT. MAPI, student didn't being set in any department, but student was as the manager assistance which given a specific project. Because of that, student didn't follow the company working hours but had own flexibility working hours. It means that student could do the work anytime, but the project should be continued outside the company. The reason also because there are no place or office provided for student to do the work, so after did observation and got data student would continue the project at home. The project was given by Mr. Andreas as the Manager of PT. MAPI and also student's field supervisor. The project was to design the company layout proposal. In doing the project, student was also helped by:

a. Mr. Andreas, as the Manager of PT. MAPI and student's field supervisor
b. Mr. Gatot, as the Head of Production of PT. MAPI
c. Paulus Damasus Dwi Putranto, as student's partner

4.2. Job Responsibilities and Authority

During the Internship, student had specific job responsibility and authority that was given by the company. The company faced problem where the company layout need to be repaired and improved. In addition, the company's production floor had poor work system. Student's job responsibility was to do the project which in every week should consulted the progress to the manager. The project was about designing the company's layout and also the new layout proposal. This layout design was the design of the whole company area, which included production floor, office, company's facilities and etc. In some week, student would also being asked to do presentation about the progress. At this point, student was expected to be able to design layout proposal to fix and give better work environment for the worker. In other ways, student was also given some authority by the company:

a. Student was allowed to ask the Manager and workers any information regarding to the project.
b. Student was allowed to collect data from the Manager regarding to the project
c. Student was allowed to perform observation on the field

d. Student was allowed to finish work anytime, in other words, author didn't have to follow the company working hours.

4.3. Work Implementation Methodology

During the Internship, author was expected to focus and finish the project as soon as possible. In order to achieve the objective, student has work implementation methodology so student will be focus on finishing the project. The work implementation methodology is shown in the Figure 4.1 below.

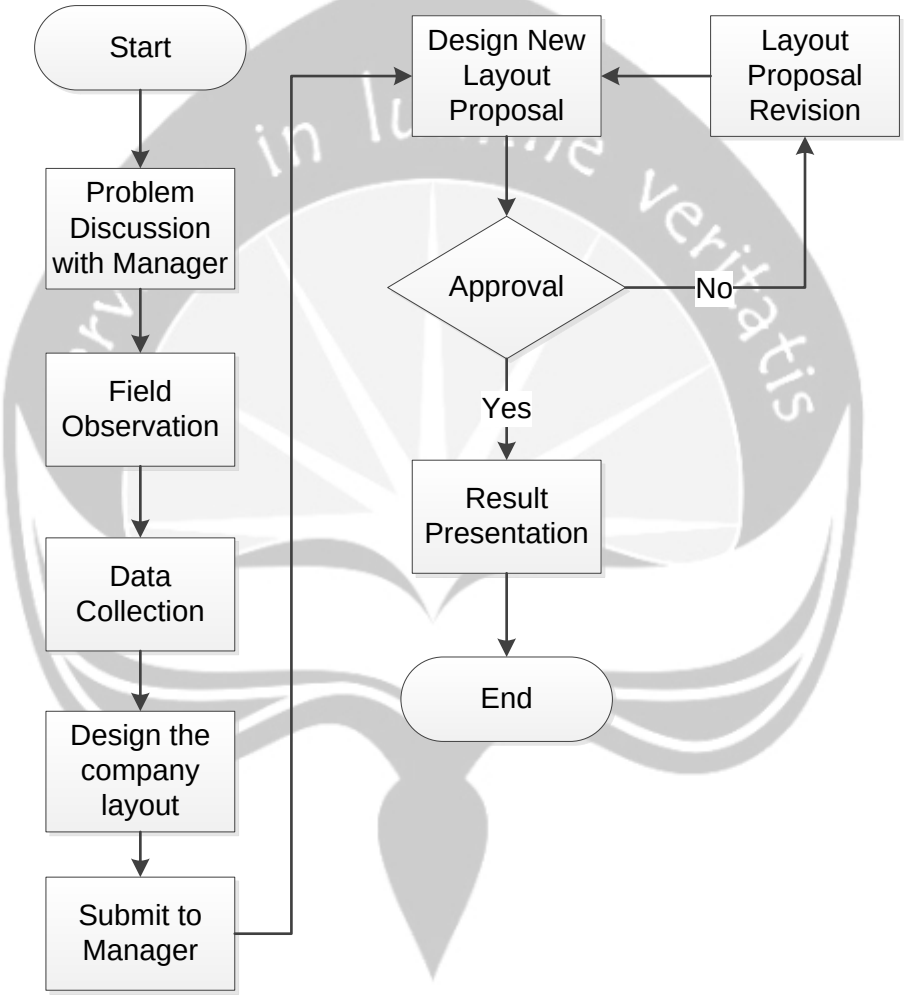


Figure 4.1. Work Implementation Methodology

Firstly, there is problem discussion with Mr. Andreas as the manager of the company. The discussion is about the problem that is occurred in the company and need to be fixed.

The task that was given firstly was to design the layout of the company. Then, next step is collecting data of the company current layout such as measuring the

dimension of the company layout, distance between each department, facilities location such as mosque, toilet, kitchen, etc. After collecting and getting all the data, next is design the company layout using Microsoft Visio. Designing the layout specifically starts from every departments, all of the company facilities until the floor line. When the layout has been finished, it will be submit to the manager as the company's files.

The next step is design the new layout proposal, where in this process design the layout proposal with additional part such as guest room requested by Mr. Andreas. After the layout proposal was done, student would do consultation with manager before result presentation. During consultation, student showed the result of new layout proposal and the manager gave advice and revision if it was needed. If there was a revision asked by Mr. Andreas, student did the revision with given duration. When the proposal layout has been approved, there will be final result presentation. In this step, student presented specifically of the layout proposal.

4.4. Work Result

4.4.1. Data and Discussion (Current Company Layout)

In order to complete the layout design, data collected from field observation is such as the current layout dimension, department location. The data of current layout dimensions can be seen below in Table 4.1.

Table 4.1. Company Layout Dimension

No.	Department	Dimension (m)
1.	Office	9,9 x 2,9
2.	Front Warehouse	9,9 x 4,8
3.	Mushola	2,5 x 2,5
4.	Kitchen	2,3 x 1,8
5	Old Raw Material Warehouse	9,9 x 6,5
6.	New Raw Material Warehouse	6 x 6
7.	Scrap	6,5 x 5,16

Table 4.2. Company Layout Dimension Continue

No.	Department	Dimension (m)
8.	Crusher	5,16 x 4
9.	Workshop	17,7 x 15,6
10.	Generator	3,3 x 1,6
11.	Rest Area	16 x 13,5
12.	Office Toilet	1,9 x 1,8
13.	Public Toilet	3,3 x 1,1
14.	Rest Area Toilet	3,8 x 1,8
15.	Finishing Area	22,8 x 7,3
16.	Total Company Area	78,8 x 33,7

From the data above, the current company layout was designed as follow in Figure 4.2.

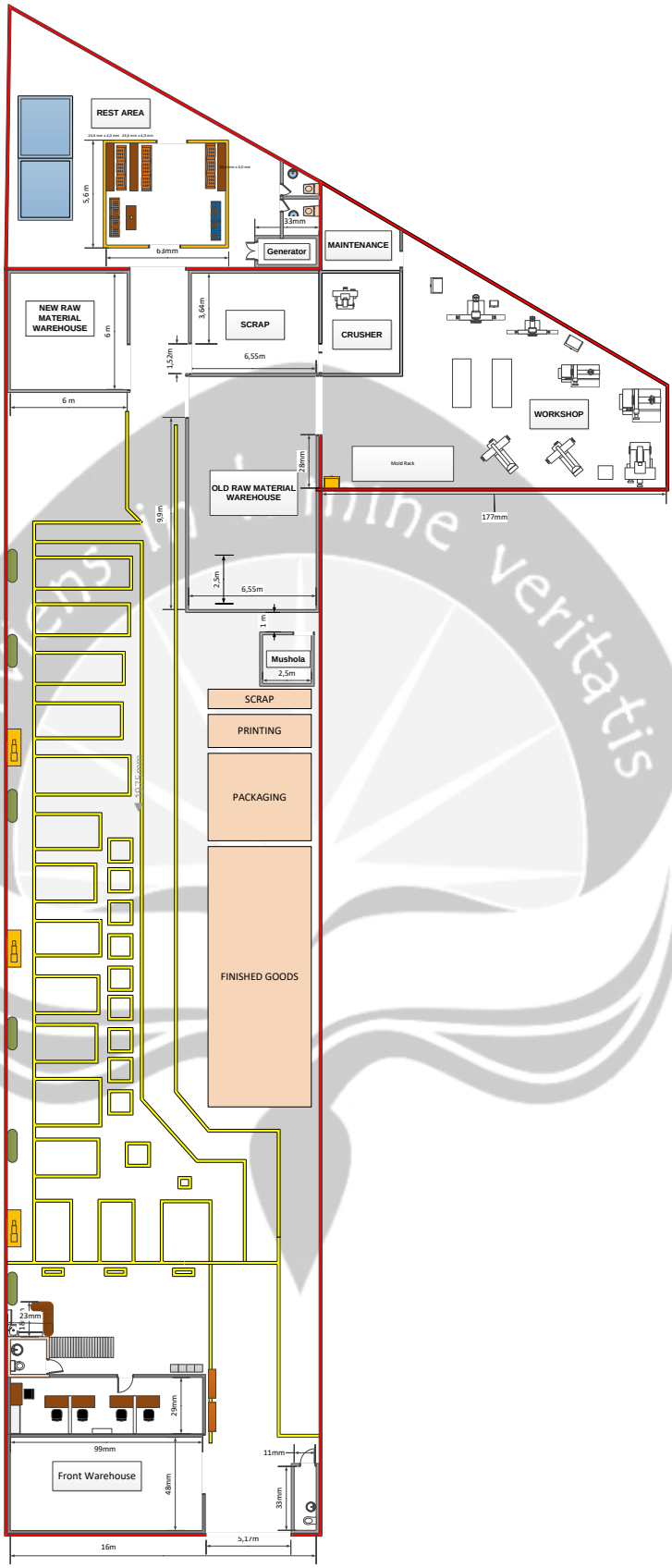


Figure 4.2. Current Company Layout

From the company layout, the departments can be described specifically for each function.

a. Office

In PT. MAPI, the office departments consist of three division which is Production, Administration or Accounting and Marketing. In the office, there is also Quality Control office where it used to do quality checking for the product or new product that will be marketed.

b. Front Warehouse

In Front Warehouse, the workers usually store the finished goods and material handling such as trolley and stacker. This front warehouse is rarely used because it is too far from the production floor. So usually, this warehouse is empty because the trolley and stacker stays at the production floor because the workers always use it.

c. Mushola

This facilities provided by PT. MAPI for Islamic workers who will worship.

d. Kitchen

There is one worker in charge that works at kitchen which served a tea or coffee for customer, worker, and guest.

e. Raw Material Warehouse

In the company current layout, there were two raw material warehouses which the old raw material warehouse and the new one. When student firstly come to work on the first week, the company was building new raw material warehouse which means the old raw material warehouse will be removed. On the first week, the progress of the new raw material warehouse was building the room barriers and on the second and third week, all of the raw materials have been moved to the new raw material warehouse and the room barrier of old raw material warehouse has also been removed.

f. Scrap

In this department, all of the scrap from the production will be gather in this room and will be sent to Crusher Department which located next to Scrap area.

g. Crusher

In this department, there is one worker in charge to put the scraps into crusher machine.

h. Workshop

In this department, where the company engineers repair the machine component. This department also where the molds were made by the engineers.

i. Rest Area

In PT. MAPI, there is rest area where the workers can have rest, and this area is used as a place to eat during the breaks.

j. Finishing Area

Finishing area consists of four parts which are for the temporary scrap placement, printing, and packaging. After packaging process has been done, the finished goods will be put and store next to the finishing area.

4.4.2. Data and Discussion (New Layout Proposal)

a. New Layout Proposal Requirements

After the current company layout had been done, student had to design new layout proposal for the company. During finishing the project, there were some requirement asked by Mr. Andreas as the manager of PT. MAPI:

i. The limitation for change of layout was only on the production floor, which means that other departments such as office, rest area cannot be moved.
ii. Front Warehouse will be removed, the space will be used for kitchen and Mushola. From the discussion with the manager, Front Warehouse will be removed because it is rarely used, and kitchen will be moved because the current location was located next to production area exactly beside the machine and compressor. Mushola will also be moved because it was located next to finishing area and it is not suitable and appropriate.

b. Layout Analysis and Methodology

In designing layout proposal, doing analysis is important which to determine some aspects related to the change of the layout. The aspects are such as the movement frequency between each departments, and distance between departments, from the aspects analysis that has been done in field observation and based on discussion with the manager, it can be decided for Activity Relationship Chart as follow:

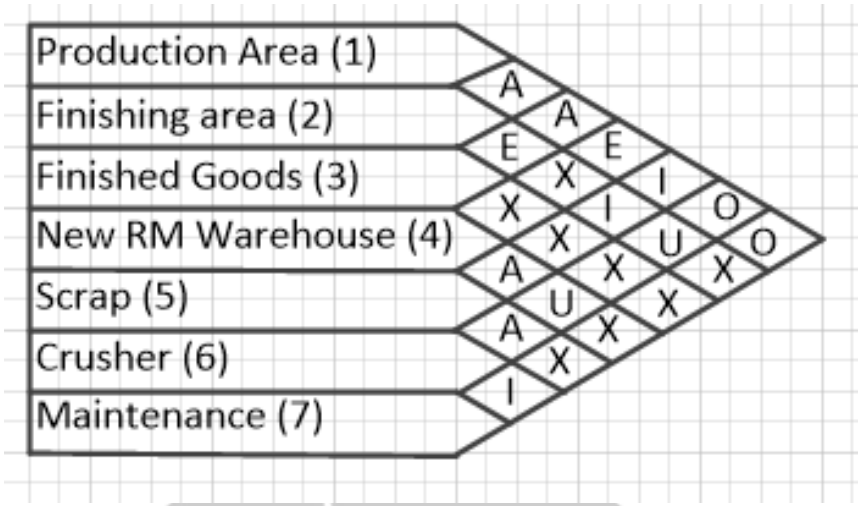


Figure 4.3. Activity Relationship Chart

With parameter:

Table 4.3. Parameter

Parameter		Score
A	Absolute Necessary	5
E	Especially Important	4
I	Important	3
O	Ordinary Closeness OK	2
U	Unimportant	1
X	Undesirable	0

From the data above, it can be described as follows:

i. From the Production Area to Finishing Area has relationship A (Absolute Necessary) with score 5 which means between Production Area and Finishing Area should be really close to each other because after the product has been produce in Production Area, the next process will be go to Finishing Area. It means that Production Area and Finishing Area connected in the production process.

ii. From the Production Area to Finished Goods has relationship A (Absolute Necessary) with score 5 which means between Production Area to Finished Goods should be really close to each other. After the product has been produced, some product will be directly put in the Finished Goods place.

iii. From the Production Area to Raw Material Warehouse has relationship E (Especially Important) with score 4 which means between Production Area to Raw Material Warehouse should be close normally because the flow of raw material is from the Raw Material Warehouse directly to the Production Area. The Raw Material will be brought by the workers using trolley to the machine.

iv. From the Production Area to Scrap Department has relationship I (Important) with score 3 which means between Production Area to scrap can be easily reachable. The scrap from the Production Area is routinely taken to Scrap Department to be gather before put to Crusher Department.

v. From the Production Area to Crusher Department has relationship O (Ordinary Closeness OK) with score 2 which means between Production Area to Crusher is not too far but still reachable without taking too much time.

vi. From the Production Area to Maintenance Department has relationship O (Ordinary Closeness OK) with score 2 which means between Production Area to Maintenance Department is not too far but still reachable without taking too much time. The relationship between Production Area and Maintenance Department where the mold result will be brought to the machine in Production Area.

vii. From the Finishing Area to Finished Goods has relationship E (Especially Important) with score 4 which means Finishing Area to Finished Goods should be close normally. After the product has passed the Finishing process, the next process the product will be sent to Finished Goods but some will be still placed at Finishing Area.

viii. From the Finishing Area to Raw Material Warehouse has relationship X (Undesirable) with score 0 which means Finishing Area doesn't has any relationship with Raw Material Warehouse.

ix. From the Finishing Area to Scrap Department has relationship I (Important) with score 3 which means Finishing Area to Scrap Department can be easily reachable. In Finishing Area, it also produces scrap which the scrap will be put to Scrap Department.

x. From Finishing Area to Crusher Department has relationship U (Unimportant) with score 1 which means Finishing Area doesn't need to be close to Crusher Department.

xi. From Finishing Area to Maintenance Department has relationship X (Undesirable) with score 0 which means between Finishing Area and Maintenance don't have any relationship in the process.

xii. From Finished Goods to Raw Material Warehouse has relationship X (Undesirable) with score 0 which means between Finished Goods and Raw Material don't have any relationship.

xiii. From Finished Goods to Scrap Department has relationship X (Undesirable) with score 0 which means between Finished Goods and Scrap Department doesn't have any relationship.

xiv. From Finished Goods to Crusher Department has relationship X (Undesirable) with score 0 which means between Finished Goods and Crusher Department doesn't have any relationship.

xv. From Finished Goods to Maintenance Department has relationship X (Undesirable) with score 0 which means between Finished Goods and Maintenance Department doesn't have any relationship.

xvi. From Raw Material Warehouse to Scrap Department has relationship A (Absolute Necessary) with score 5 which means Raw Material Warehouse and Scrap should be really close to each other because the scrap results after being finished in Crusher Department that will be gather again in Scrap Area will be put into Raw Material Warehouse.

xvii. From Raw Material Warehouse to Crusher Department has relationship U (Unimportant) with score 1 which means Raw Material Warehouse and Crusher Department doesn't need to be close.

xviii. From Raw Material Warehouse to Maintenance Department has relationship X (Undesirable) with score 0 which means between Raw Material and Maintenance Department doesn't have any relationship.

xix. From Scrap Department to Crusher Department has relationship A (Absolute Necessary) with score 5 which means between Scrap Department and Crusher Department should be really close to each other because the Scrap will be put into the crusher machine which located in the Crusher Department.

xx. From Scrap Department to Maintenance Department has relationship X (Undesirable) with score 0 which means between Scrap Department and Maintenance Department doesn't have any relationship.

xxi. From Crusher Department to Maintenance Department has relationship I (Important) with score 3 which means Crusher Department and Maintenance

Department can be easily reachable. In sometimes, the crusher machine will be check if it need maintenance of not by the Maintenance workers.

Based on the ARC (Activity Relationship Chart) and its parameter, ARC analysis can be done as follows to determine the location of each departments:

i. First Step

1	2

Table 4.4. Relationship Chart Table First Step

Code	Department	Relationship with Dept. 1-2	TCR
3	Finished Goods	A – E	9
4	New RM Warehouse	E – X	4
5	Scrap	I – I	6
6	Crusher	O – U	3
7	Maintenance	O – X	2

In First Step, it is started from choosing the strongest relationship which has A rating. From the Activity Relationship Chart, it can be seen that there are three departments have A rating or the strongest relationship. In this case, the student choose the relationship between Production Area and Finishing Area because it is the most crucial. So for Department 1 and Department 2 which are Production Area and Finishing Area will enter the layout firstly. In the analysis, Department 3 which is Finished Goods has highest Total Closeness Rating (TCR) value so Department 3 will enter the layout next.

ii. Second Step

1	2
3	

Table 4.5. Relationship Chart Table Second Step

Code	Department	Relationship with Dept. 1-2-3	TCR
4	New RM Warehouse	E – X – X	4
5	Scrap	I – I – X	6
6	Crusher	O – U – X	3
7	Maintenance	O – X – X	2

In Second Step, Department 3 has entered the layout and it is located next to Department 1 because it has the strongest relationship with A rating. Department 5 has the highest TCR value based on the analysis so Department 5 will enter the layout next.

iii. Third Step

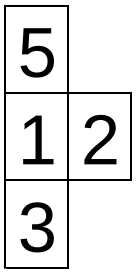


Table 4.6. Relationship Chart Table Third Step

Code	Department	Relationship with Dept. 1-2-3-5	TCR
4	New RM Warehouse	E – X – X – A	9
6	Crusher	O – U – X – A	8
7	Maintenance	O – X – X – X	2

In Third Step, Department 5 has entered the layout and it is located near to Department 1 and Department 2 because it has stronger relationship than to Department 3. Department 4 has the highest TCR value based on the analysis so Department 4 will enter the layout next.

iv. Forth Step

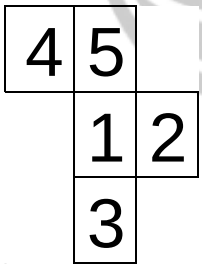


Table 4.7. Relationship Chart Table Forth Step

Code	Department	Relationship with Dept. 1-2-3-5-4	TCR
6	Crusher	O – U – X – A – U	9
7	Maintenance	O – X – X – X – X	2

In Forth Step, Department 4 has entered the layout and it is located next to 5 because it has strongest relationship which is A rating and it should be near to Department 1 because Department 4 which is New RM Warehouse should be near

to Department 1 which is Production Area with E rating (Especially Important). Department 4 has the highest TCR value so Department

v. Fifth Step

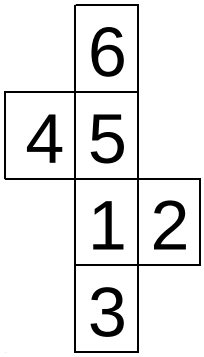
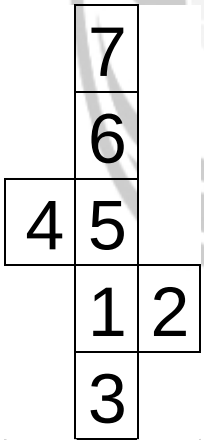


Table 4.8. Relationship Chart Table Fifth Step

Code	Department	Relationship with Dept. 1-2-3-5-4-6	TCR
7	Maintenance	O – X – X – X – X – I	3

In Fifth Step, Department 6 has entered the layout and it is located next to 5 because it has strongest relationship which is A rating. Because the only department left is Department 7 so it will enter the layout next.

vi. Sixth Step



In Sixth Step which is Department 7 as the last department enter the layout. It is located near to 6 because it has stronger relationship among other departments.

c. New Layout Proposal Result and Discussion

Based on the company requirements that have been stated **4.4.2** part a, and data analysis based on ARC (Activity Relationship Chart) the new design of layout proposal can be seen in figure 4.4.

Based from the requirement from the company and data analysis, it can be seen that the new layout proposal has modifications:

i. There is additional facility which is Canteen consists of the Kitchen Department from the current company layout. It is located side by side with Mushola which located in the place where it used to be Front Warehouse. This replacement is done because the kitchen is used to locate next to Production Area, specifically beside the machine.

ii. Finishing Area which consists of Finishing, Packaging and Printing is moved next to Production Area because based on the ARC analysis, the relationship between Finishing Area and Production Area has strongest relationship which is Absolute Necessary and the Finishing Area should also located near to Finished Goods. Based on field observation, Finishing area will be better if it is located next to Production Area because the sequence of the process after the product had been finished it will be transferred to Finishing Area for inspection and packaging process. Besides that, other department location doesn't have any change or transformation because it is already located based on the Activity Relationship Chart and its analysis.

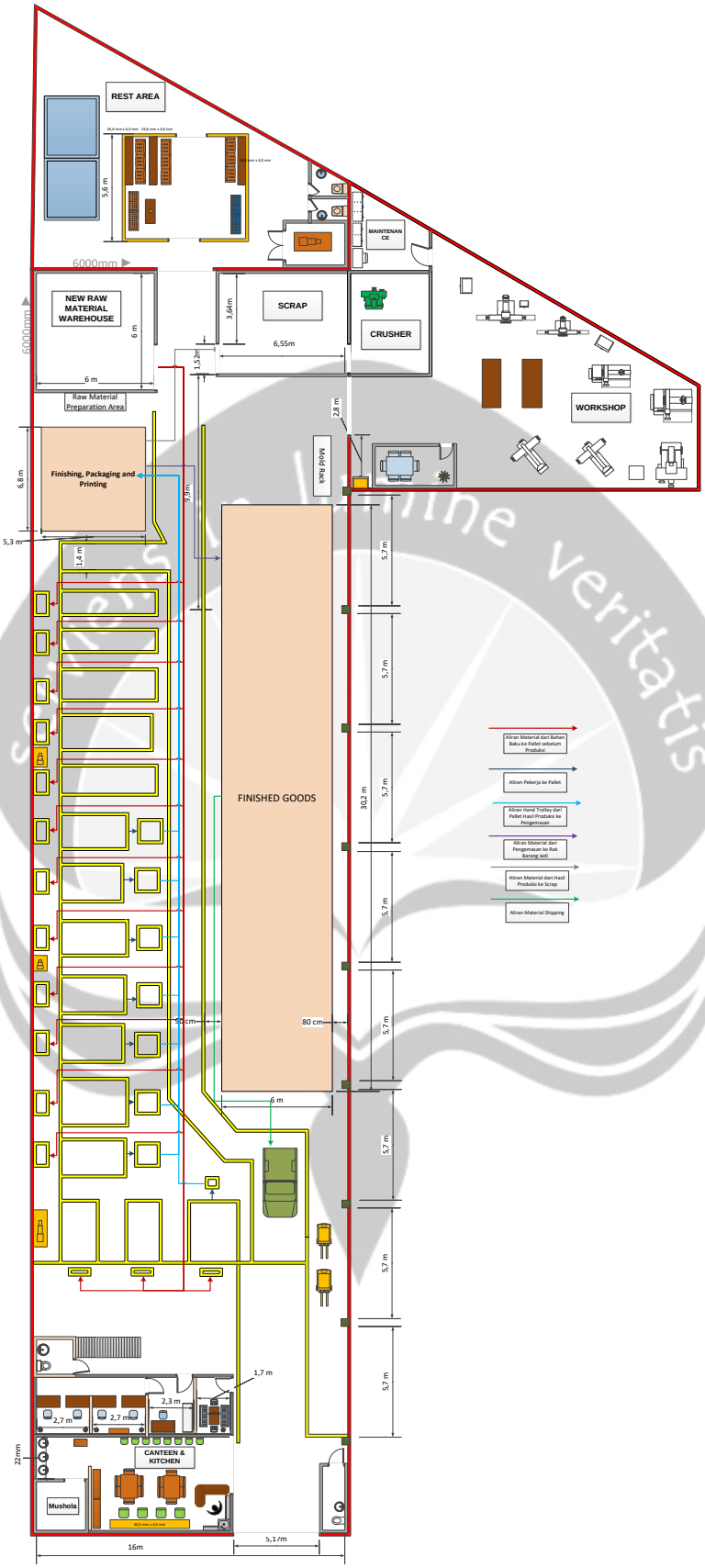


Figure 4.4. New Layout Proposal

4.4.3. Overall Evaluation

Based on the work result that has been done and compare to current condition when the project has not been done it can be evaluated:

a. Student has contributed on finishing the project regarding to improving the company layout become better. Student worked for Mr. Andreas as the Manager of PT. MAPI on finishing the project.
b. Student was offered the project because the majority of student is Industrial Engineering which has knowledge in designing layout.
c. Student has made transformation on the layout of PT. MAPI which move the location of Finishing Area which has purpose of reduce the distance between Finishing Area and Production Area because both departments have strong relationship. From the transformation, it will change the flow of the production process become smoother and faster.
d. Student has finished the project on time, and the result of the project has been approved by the company and it can be proved that the result is applicable based on the Manager's statement, the result will be implemented as soon as possible.

CHAPTER 5
CLOSING

Based on the project and task or job that has been done by student during Industrial Practice, there are conclusion that can be stated which are when doing the Internship, student isn't being placed in any department but student was given certain project with topic "Layout" by the company. In addition, student doesn't has to follow the working hours of the company, because the company doesn't provide the facilities to do the project so after collect data and do field observation in the company, student can go home and continue the project outside the company area. In PT. MAPI, they produces variants of products but with 1 type of raw material which is plastic seeds HDPE type. In doing the project, the methodology that is used to designing new layout proposal is ARC (Activity Relationship Chart) which to defined the closeness relationship between each activities in every departments. Based on the analysis result, in new layout proposal, there is modification for the Finishing Area. Finishing Area is moved next to Production Area because based on the ARC analysis, the relationship between Finishing Area and Production Area has strongest relationship which is Absolut Necessary and the Finishing Area should also located near to Finished Goods.

Besides that, student has suggestion regarding to improve the company in any aspects. Student thinks that PT. MAPI should consider more about Safety and Health Management in the company especially in the Crusher Department which the crusher machine produce noise and dust. PT. MAPI should also provide more facilities to support the production such as the material handling.

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