APPROVAL SHEET

Internship Report conducted at PT. MITRA REKATAMA MANDIRI INDONESIA from January, 06 2018 to February, 06 2018 and prepared by :

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Yogyakarta, 10 July 2018

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Telah selesai melakukan Kerja Praktek di Perusahaan PT. Mitra Rekatama Mandiri, pada tanggal 06 Februari 2018

Demikian Surat Keterangan ini dibuat, untuk dipergunakan sebagaimana mestinya.

Klaten, 21 Februari 2018
PT. MITRA REKATAMA MANDIRI

Priyani Wismawati, SE

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Yogyakarta, 10 July 2018

Writer

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- This presentation is based on the book Effective FMEAs, by Carl S. Carlson, published by John Wiley & Sons, © 2012.
- Information about the book and links to useful FMEA articles and aids can be found on www.effectivefmeas.com.
- If you have questions or comments about this presentation, the subject of FMEAs, or the book Effective FMEAs, please send an email to the author at Carl.Carlson@EffectiveFMEAs.com.

CHAPTER I

INTRODUCTION

This section discusses about background and purpose of the implementation practical work and an explanation of the place and time of practical work.

1.1. Background

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

Job Training can be said to be a simulation event of Industrial Engineering students profession. The paradigm that should be inculcated is that during the Student Work Practice work in the company he chooses. Work, in this case includes the activities of planning, design, improvement, implementation and problem solving.Therefore, in the Job Training activities undertaken by students are:

1. Recognize the scope of the company
2. Following the work process in the company continuously Work on the tasks assigned by superiors, supervisors or field counselors
3. Observe system behavior
4. Compile reports in written form
5. Carry out the Job Training exam

Industrial engineering is a branch of engineering that deals with the planning, design, improvement and installation of integrated systems comprising human, machinery, materials, information, energy, work methods and financial resources or briefly reviewing industrial systems. In particular, within the scope of Industrial Engineering must always be realized that which is examined is the unity of system elements consisting of Humans, Machines, Materials, Methods, Money, Energy, Environment and Information. That is, withincarry out the activities under his responsibility, Bachelor of Engineering Industry must always view its activities within the framework of the

system surrounding the activity. Competencies help by students and Industrial Engineering graduates include:

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. Planning Layout of Manufacturing Facilities.
10. Organizational Management.
11. Cost Analysis.
12. Industry Feasibility Analysis.
13. Process Design and CAD / CAM, and others.

1.2. Purpose

Things to be achieved through the implementation of Job Training are:

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

1.3. Place and Time Of Internship

This practical work will be done counted, start on January 6, 2018 until Frbruary 6, 2018 at PT. Mitra Rekatama Mandiri Klaten. In this practical work the author is placed in Quality Control Department in accordance student competence. However, the practical work participants were also given a schedule and placed in each department other than the selected department, in order to know thoroughly the operation in Pt. Mitra Rekatama Mandiri Klaten.

CHAPTER II

COMPANY OVERVIEW

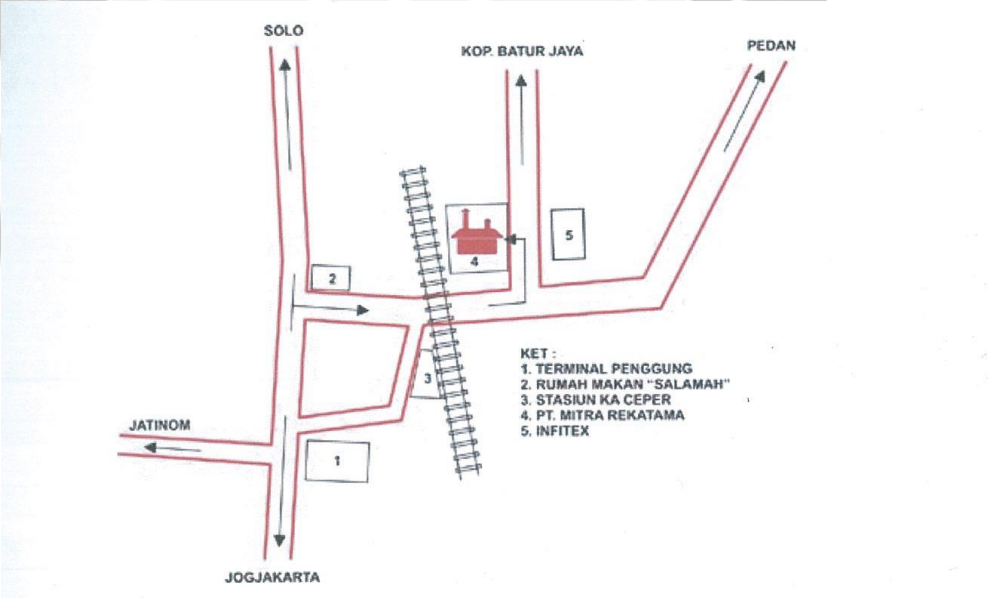
This section discusses about the history, corporate organizational structure and management contained in PT. Mitra Rekatama Mandiri Klaten.

2.1. Profile Of the Company

In this section will be discussed about the location or relocation , the development of the company and the resulting product, certification ro company achievement, company uniqueness and many others.

2.1.1. Company Location

PT. Mitra Rekatama Mandiri was established outside the city of klaten precisely on the road Cooperative Baja Ceper, Klaten, Central Java, approximately 30 km direction of Surakarta. As for the location of the factory PT. Mitra Rekatama Mandiri itself is adjacent to the Penggung Terminal and Ceper Station, as shown in figure below :



Picture 2.1. Map Company Location

In setting up a factory need to consider several aspects, one of which is the location. The reason for choosing the location in this place based on several aspects, among which are:

a. Economic Aspects

Around the location of PT. Mitra Rekatama Mandiri stands as well as companies engaged in the same field, this can simplify the search for raw materials to the provision of raw materials, and also the search for sources of labor around it so that the cost of both of these things can be reduced cheaper.

b. Aspects of Labor

To find workforce for PT. Mitra Rekatama Mandiri is not too difficult because the surrounding area is quite a lot of experienced workforce in terms of metal casting, as well as the success of government programs in terms of pressing the unemploymentrate.

c. Aspects of Transportation

Location PT. Mitra Rekatama Madiri adjacent to the highway which is the main line Jogyajarta-Solo majors, so that this situation can expedite the process of raw materials products.

d. Historical Aspects

Batur village has always been known as a producer of metal equipment, so this is a good start to always develop the business in reaching further levels.

e. Aspects of the Future

The possibility of the development of the company is quite potential because there is still unused land, so the expansion of the factory can still be done. The land area owned today is 7200 square meters, while the building area is 3750 square meters. For factory layout, PT. Mitra Rekatama Mandiri has the following facilities: Office Building, the room for the production process and legacy that is located behind the office, the room facilities for employees or mess employees and Cafeteria or kitchen.

2.2. History of the Company

PT. MITRA REKATAMA MANDIRI was founded by Mr. Drs. H. Yahya Noor. He was born in Purworejo Central Java in 1956 from a family background of agari. His education begins in Purworejo, then in Termas Pacitan, S1 degree in the Islamic Culture of IAIn Sunan Kalijaga Yogyakarta and take S2 at UMS Surakarta. In 1984 he founded a company that was named CV. Teknik Utama that move in casting and machining, at that time the company worked on orders from PT. Yamindo/ Yanmar Pandaan, Malang, East Java in the form of agricultural tools. Then in 1991 began a long-term cooperation contract with several companies that one of them is Pt. Brantas

Mulya Surabaya. After working with PT. Astra Mitra Ventura (AMV) Jakarta in 1997 and since January 28, 1997 CV. Rekayasa Utama changed into PT. Mitra Rekatama Mandiri.

2.3. Organizational Structure

For organizational structure in PT. Mitra Rekatama Mandiri there are seven positions in the company. The first one is the director or we can consider as Board of Commissioner whose responsibility is to control over all the activity of the company includes a deal with the administrative and manage the financial and human resource. There are several obligations that board of commissioners can take the responsibility to appoint and dismiss the management of the company which is decided in the meeting with the most votes. Having authority in the case of loans with financial. Establishing general discretion and company operations based on shareholder decision. Arranging and planning strategy in consisten term that can appropriate in short term plants with the long term plans. Has a responsible for the company's operating results. The second part is the marketing department that is responsible for the ordering of goods, delivery of goods, what goods are needed by consumers in the market, anyone who becomes a competitor today.

For the operational part of production will be responsible for the production floor is the raw materials needed for production, division of labor for casting, monitor the work in the sub-operational parts, and cooperate with the PPIC section for scheduling raw materials to be produced, maintenance and warehousing. The last sub-section is the finance and administration department where it has responsibility for the purchase of raw materials needed on the production floor, consumer payments already order goods, and via financial transactions.

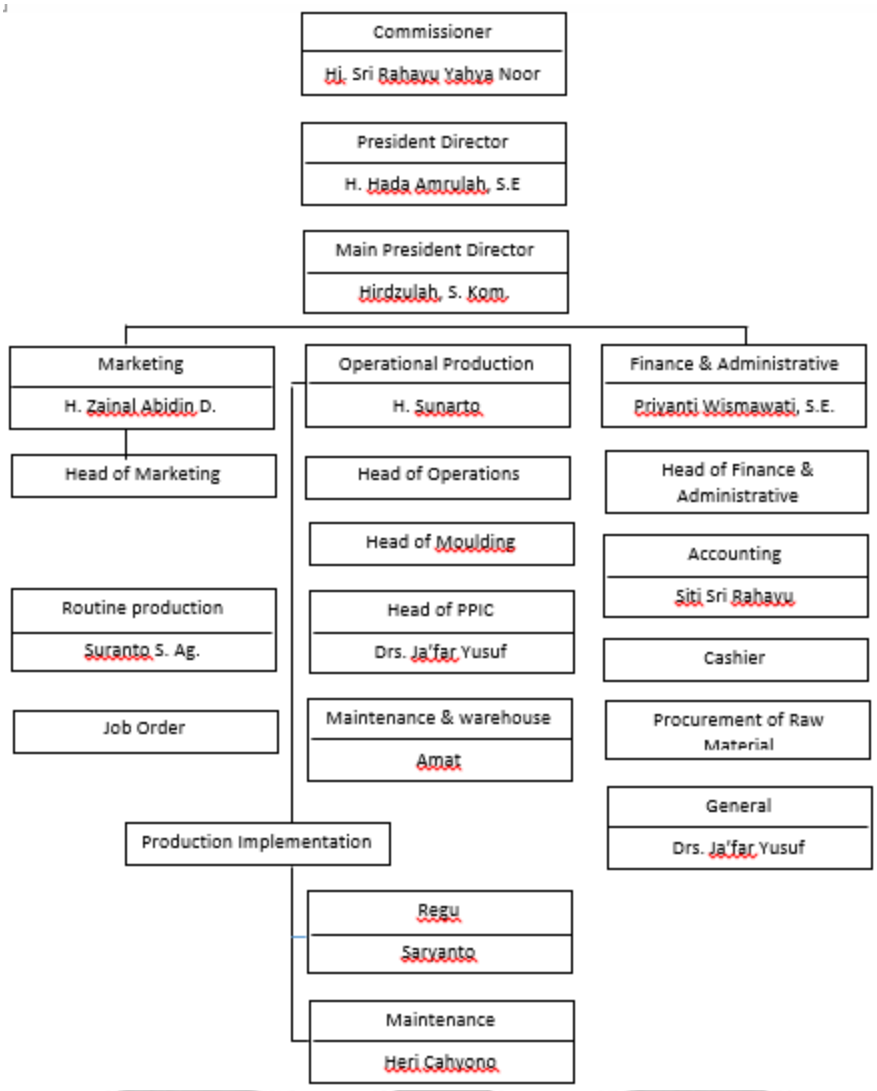


Table 2.3. Organizational Structure

2.4. Company Management

This Section will describe of vision and mission, company values, employement, marketing, and facilities.

1. Vision and Mission of Company

a. Vision

The Vision of company is "the work of dedication to give mutual benefit".

b. Mission

Being a indepedent, innovative and professional company that can survive in the era of globalization.

Become a market leader for similar businesses in Ceper and surrounding areas.

Become a company as a permanent livelihood for its employees.

2. Employement

Labor is one of the important factors in the production process, in addition to raw materials and machinery. in the absence of manpower although the raw materials and machining facilities are met, then the production process can not take place because the workforce is the executive in the production process. Employees of PT. Mitra Rekatama Mandiri Klaten is grouped into several groups which is :

a. Permanents Employements

Permanent employees are those based on procedures and a formal decision as stipulated in the labor agreement has been formally accepted and a wage or salary every month. Permanent workers who work in PT. Mitra Rekatama Mandiri Klaten is 90 people. The company's workforce is divided into 5 departments. Details of total workforce at PT. Coca-Cola Amatil Indonesia can be seen in table 2.4 below.

No.	***Job Title***	**Number Of Worker**
1	*Induction Departments*	6
2	*Molding Deparments*	18
3	*Waste Machining*	4
4	*First Machining Departments*	30
5	*Second Machini Departments*	30
6	*Driver*	2

Tabel 2.4. Amount of employee in PT. Mitra Rekatama Mandiri Klaten

i. Contract Employements

Contract employees are those based on procedures and a formal decision as stipulated in the labor agreement has been formally accepted and a wage or salary every month.

ii. Daily Employements

Daily employees are those based on procedures and a formal decision as stipulated in the labor agreement has been formally accepted and a wage or salary every month.

iii. Honorer Employements

Honorer employees are those based on procedures and a formal decision as stipulated in the labor agreement has been formally accepted and a wage or salary every month.

To maintain a harmonious relationship between the company and its employees, then PT. Mitra Rekatama Mandiri provides social security for employees, such as: providing full uniforms, providing housing allowances, providing premiums, and providing transportation during out-duty and polyclinic for employees.

a. Working Hours

In order for workers to work well in performing their duties, it is necessary to set a good working time. Working hours set by PT. Mitra Rekatama Mandiri Klaten is 40 hours a week, the rest is considered overtime. Working time is nine working days for permanent employees and outsourced employees. Each shift has a working time of eight hours.

Employees working in the production and machining process work based on shifts, where one shift is seven working hours with one hour of rest time, with the following:

a. Shift 1: 07.30-11.45, rest period at 12.00-13.00.
b. Shift 2: At 13.30 until 15.30 working time

Workers working on shifts like this, they get hours of rest for an hour. While for office worker staff, her working hours are:

a. At 08.00-12.00 WIB: work time.
b. At 12.00-13.00 WIB: rest time.
c. At 13.00-16.00 WIB: work time.

Working hours for induction departments and molding making employees come in an hour earlier than the employees of the production and employees of the machining process. Here's the sharing:

a. *Shift* 1: At 07.00-11:15, rest time at 12.00-13.00
b. *Shift* 2: At 13.30-15.30 working time

Each shift will experience a turnover of work hours every week. The rotation of working hours or shifts is done in accordance with policies that have been regulated by PT. Mitra Rekatama Mandiri.

During big holidays such as Idul Fitri or Christmas, workers who will be on duty will be scheduled a minimum of a week before the holiday arrives. The maximum employee overtime per day is three hours on weekdays (workdays), with the maximum overtime time per week being 14 hours. For holidays the maximum overtime time is 23 hours.

b. Wage system

Salary or wage is an an acceptance is return for the work of the employee for the work done which is assessed in the form of the agreement and the law. Many waysor wage payment system or salary used by the company. Each company has different ways of wages. On the basis of the system will bring good luck to the company without harming the workforce or employees.

Wages system at PT. Mitra Rekatama Mandiri Klaten adjusted to the Regional Minimum Wage (UMR). while for overtime employees who work outside the appointed working hours then the wages received will be given according to the existing employment contract.How employee salary is provided at the end of each month for employees with monthly employee status, weekly for daily employee status and for seasonally paid employees on demand.

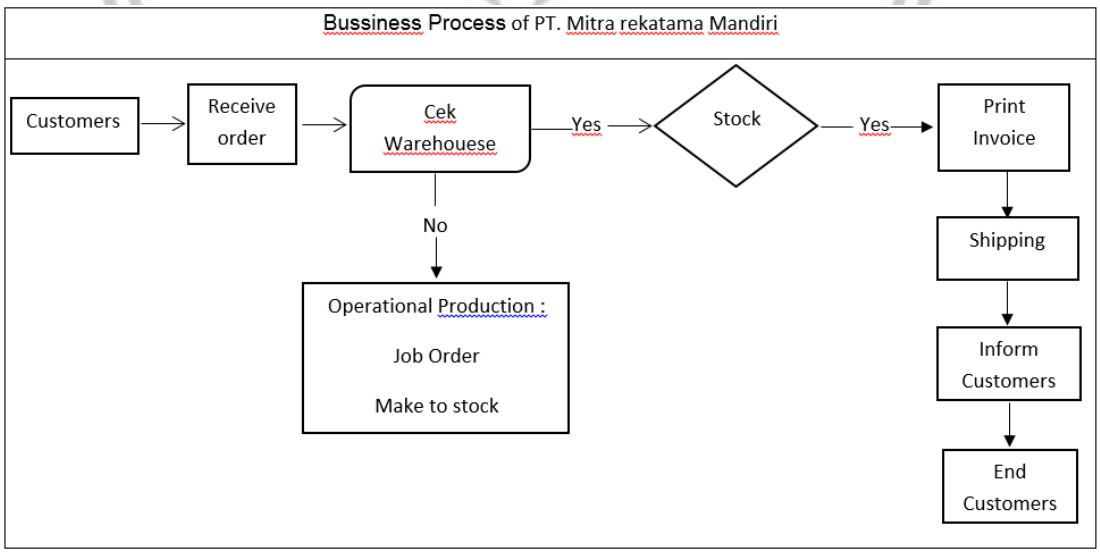
CHAPTER III

COMPANY SYSTEM OVERVIEW

This section discusses about the system production that contained in PT. Mitra Rekatama Mandiri Klaten.

3.1. Bussiness Process

For Process bussiness PT. Mitra Rekatama Mandiri is started with customers can come directly to the company, or can order by via cellphone or email with reservations precise and accurate. Most customers of PT. Mitra Rekatama Mandiri already know and already familiar with the products produced by the company itself so that customers do not have to worry about the quality of its products. After ordering the marketing department will receive the order and then will check to the warehouse because PT. Mitra Rekatama has fixed customers they are: PT. Yamindo, CV. Mega Jaya Ergo Agung, Cahaya Mas, PT. Batur Arta Yulis, Teknik Diesel so if at the time of checking in warehouse and stock of product still available then will direct in print invoice then send if ordering outside java it will be send by via transportation from PT. Mitra Rekatama Mandiri. However at the time of checking in the warehouse but the product is blum ready it will be reported to the operational production and immediately



made the product. Here is the process of busines in PT. Mitra Rekatama Mandiri.

Table 3.1. Bussiness Process of PT. Mitra Rekatama Mandiri

3.2. Products

To make a products of PT. Mitra Rekatama Mandiri there are several kind of raw material that use to make the products which is :

1. Raw Material Mold

To make one mold the raw materials that use to make mold they are sand print. There are several kind of sand that's why to make one mold, sand that use by workers have to follow the standard in the company, which is :

i. Have properties that meet the requirements of the power that is suitable, the resulting prints should be strong so it is not damaged so often by the way that the molten metal is poured into it, so the power on the temperature of the mold and heat power is indispensable.

ii. Permeability That Suitable

It is contemplated that the cast results will be defective such as shrinkage of cavities, gas bubbles or surface roughness, except for gases occurring at the time of castings distributed through the sand cavities.

iii. Large distribution of suitable grains

The surface of the cast is expanded when castings are made in fine-grained moldings, but if the grain is too soft the gas is prevented from leaving and causing the result to be defective, ie the occurrence of air bubbles.

iv. Hold the temperature to be poured into the mold

v. Must have a suitable composition

Must have a suitable composition Grains of sand and metal are poured into contact so that the physics and chemical events. Mixed materials that may produce gases or dissolve in metals are undesirable.

vi. Market can be reused

vii. Sand should be cheap.

a. Various Kind of Sand Prints

The usual sandpaper is mountain sand, beach sand, river sand, and silica sand. If the sand has a suitable clay content and is adhesia it can be directly used, but if the nature of adhesion is less then need to be added. Sand with a clay content of less than the dose will have a weak adhesia and can be used only when clay is added sufficiently. The shape of the printed sand as follows:

i. The arrangement of printed sand

The form of sand can be classified into 2 types, namely round sand and grained sand. The round sand requires only a small amount of binding to obtain a certain permeability and strength, and excellent flowability. Crystal-grained sand is not good for printing, because it breaks into small grains of mixing and provides poor fire resistance and permeability and requires more binding.

ii. Clay

Clay consists of kaolinite, manmorolinite, quartz, phosphate, mica and other impurities. Grain clay grain size is about 0.005-0.02 mm, for larger castings used silica sand that has been mixed with clay soil.

iii. Another binder

iv. These other binders are often made of sand sprayed from vegetable oils, such as linseed oil and soybean oil. It is then served at 200-250°C and this is called oil sand. Oil sand is not easy to absorb water and easily collapsed during demolition time. This sand requires bentonite and starch to be easily formed and processed even at temperature.

v. Special enhancements

Particular additives include charcoal powder, wheat flour, coke soda, or graphite flour affixed to about 1% in the printing sand to smooth the surface of the cast, using this addition, the coating will be easier and in some cases prevent the rough surface. Meanwhile, if there is additional surplus it will cause defects in the castings, because of the gas that is formed. It is therefore important to use in suitable quantities.

b. Bentonit

Shaped volcanic ash that has been weathered. Beneficial to increase the binding capacity of the wet sand, this bentonite is used when the usual sand mold is strongly felt to print the metal, with the desired molding conditions having considerable dimensions.

c. Drops

Serves as a binder, this drop has a high adhesion strength, pans resistance, moisture resistance, with flat surface results, can be hardened in the air, cheap and cheaply made, the drops are used for cement molding process.

d. Water

Water is used to make wet sand molds, at the time of sand molding, the moisture content in the mold is 3.7% - 4%, after the mold is finished then the mold will be idle for 2 to 3 days, for drying impacting sand mold will be stronger, and also avoids the reaction of liquid metal with water (avoiding defects in production), after 2 to 3 days the moisture content in the mold is approximately 0.7%.

2. Raw Materials of Molding

The raw materials of Molding can be differentiated into main raw materials and additional raw materials.

a. Main Raw Materials

i. Iron scrap

Iron scraps are scrap metal scraps that are not used anymore, and cast iron produced from the product fails in the production process which is then recycled.

ii. Steel scrap

Steel scrap is used as raw material, and generally 30-40% of metal raw materials are steel scrap, especially for high-strength cast iron, so the number of steel scrap is also more.

iii. Pig iron

Pig iron is a steel back scrap from the production process, for example a defective cast.

3. Additional raw Materials

The addition of raw materials supporting the molding industry is intended to obtain good quality castings. It is intended that the casting objects obtain the properties in accordance with the expectations or plans of manufacture. These materials include:

i. Carbon (c)

Carbon need additional to get hardness of cast object. The carbon used in this case is coconut shell charcoal.

ii. Magnesium (Mg)

The addition of this element is intended for the production results have good ductility.

iii. Silicon (Si)

The addition of this element is intended for the production results have the properties of acid resistance and corrosion. Silicone also serves to maintain the durability of cast iron against the surrounding air that reacts.

iv. Mangam (Mn)

The addition of this element serves to increase the hardness and strength of cast iron. Magan also serves to bind sulfur that is very harmful that can cause casting perforated or porous objects.

v. Phosphorus (P)

The addition of this element is intended to decrease the melted point of molten metal.

vi. Slag fastener (slag)

The slag handle serves to bind or collect dirt or slag from the metal liquid. It is usually given when the molten metal is inside the pouring cup prior to the mold.

3.3. Production Process

3.3.1. Production System

Production system is a certain interrelation of different elements in an integrated, integrated and comprehensive in the implementation of the production process to produce goods and services.

Production system at PT. Mitra Rekatama Mandiri is basically the same as the existing production system in some metal fabrication in general.

Basically this production system can not be separated by the input (input) production system and output (output) production system that exist within the company. If in a production system will not mean, as well as elements of other production systems. while the function of the feedback itself is as a control condition of the production system to run properly. Thus between the input and output of the production system can not be separated from one to another.

3.4. Production procedure

Production procedures are steps that must be taken sequentially from start to finish (output) as expected and involve more than one person in one or more departments. The procedure contained in PT. Mitra Rekatam Mandiri is as follows:

i. Purchase of raw materials (reservations) made or recorded in administration.

ii. Marketing department will be an order to the production, then the production section will perform production planning. The resulting product arena is the production of job order, then the planning is adjusted to the booking order.

iii. In the processing process begins a process of making patterns according to the drawings of the design of the engineering section up to the packaging. The finished product will then be packaged and then it will be stored in the finished product warehouse. The finished product warehouse there can already be sold into the market.

3.5. Production Planning

At PT. Mitra Rekatam Mandiri in producing its products based on job order, that is making products based on order. Therefore, the company finds difficulties in scheduling the production, inventory, raw materials that are needed with certainty in the future. This is understandable because the orders that come in each period tend to change, therefore in the production section must adjust its production with existing orders, both of the type of production, the deadline of order and quantity of products to be made.

As has been known that the main aspects of management are contradictions, in addition to leadership. Regulators can run well if inside teradapat planning, division of tasks and coordination tasks. Planning is the first and most important aspect that must be done by PT. Mitra Rekatama Mandiri. In this case after receiving the Po (process order) and the DS (delivery schedule) of the orderer who will order the product according to the type, size, and model (drawing) of the product type, then made the planning.

Planning here has the purpose of trying to make finished goods the right product in accordance with customer needs, both in quantity and in time which of course, should pay attention to quality and price. The result of the plan is in the form of a work plan, including the arrangement of materials used by opertor, machines, facilities used, the number of orders obtained, the remaining orders and others.

3.6. Flow Diagram Process

Flow diagram process is an illustration that shows the activities of the production process is the flow of input and output. The flow of existing processes at PT. Mitra Rekatama Mandiri can be described as follows:

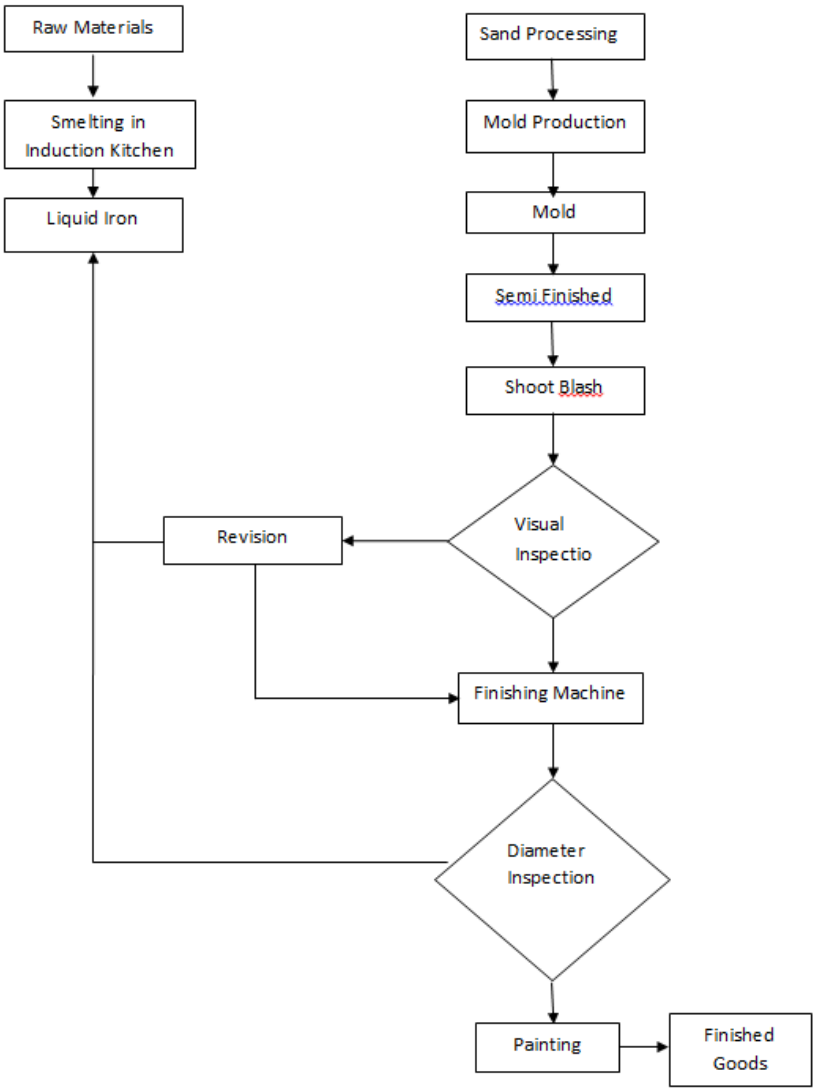


Table 3.6. Production Process Flow Diagram Molding

3.7. Molding Proses

This process is a very important process in the development of metal and machinery industries. The fabrication process involves: making mold, metal melting, mold molding, freezing molding and mold disassembly. The first Printing Process is making mold. For molds can be made by hand or can be made also made with a printing press.

i. Making Prints by Hand

   Hand-made printing is done when the production amount is small and the shape of the cast is large.

ii. General Print and Couple Printing

Making hand-made prints of wet sand can be done in the following order :

i. The printed board is placed on a flat floor with sand spread out horizontally.

ii. Patterns and frames for drag are placed on a printed board. The printed frame must be large enough so that the sand is 30-50 mm thick, place the pre-determined descending channel first.

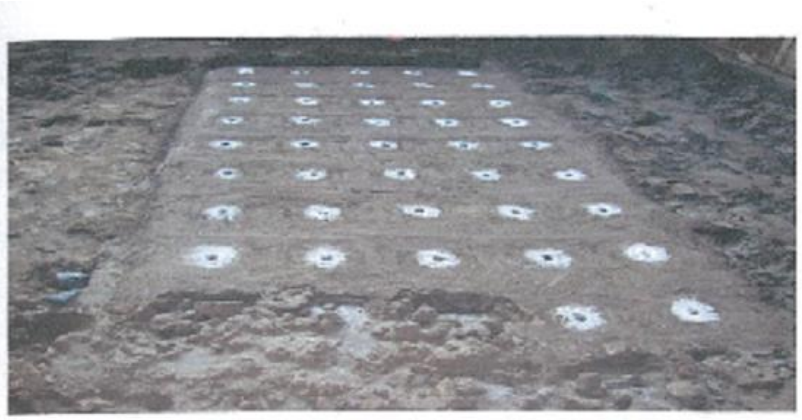
iii. Sand advance first diayak then sprinkled to cover the pattern surface in print. The sand layer is 30 mm thick.

iv. Sand bead dumped on it and then compacted with pestle. In this pounding process should be done carefully so that the pattern is not pushed directly by the pounder. Then the sand is pounded over the top edge of the frame, the mold is moved and then the mold is lifted together with the pattern of the molding board.

v. The mold is then flipped and placed on a molding board, and half the other pattern together with the molding frame for the coup is mounted on it.

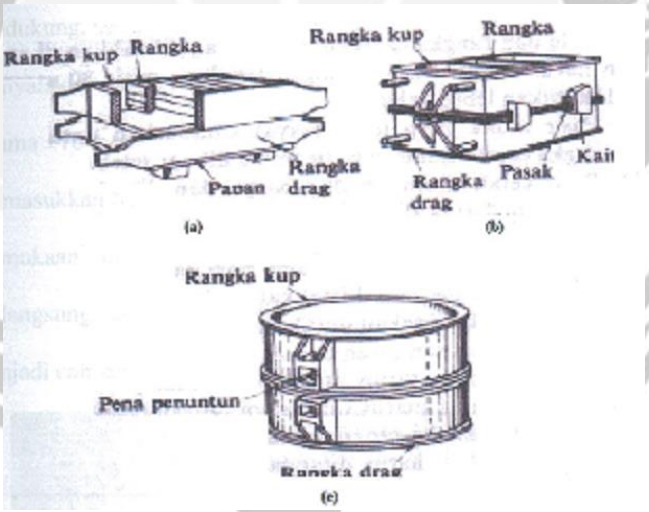
vi. The turbine trunk or pattern for the adder is installed, then the sand face and the printed sand are inserted into the mold frames and compacted. Then if the molding frames are fitted in the lid, then the coupler is separated from the drag and laid flat on the printed board.

vii. Channels and drains are made using spatulas. Previously the pattern for the flow is installed first with the position in contact with the main pattern, if not necessary to be made with a spatula. Then the pattern is taken from the mold using the jara. The matching core is installed in the mold cavity then the coup and drag are closed, then the molding is finished like this picture below :



Picture 3.7. Example of Finished Molding

The often used mold frames are wood and metal, as shown in the picture, Where the mold sand is compacted and compacted to form a mold. The printable frame that can be opened.



Picture 3.7. Drawings of Wood and Metal

1. Metal Melting

To be printed into a mold, the metal must be liquid in order to require a melting process that is done with a high-kitchen process.

For the first process preparation which is :

a. Preparation of induction kitchen

b. Pouring tools (label / cowey)

c. Molding press

For the process of smelting the metal is :

a. Controls induction kitchens, raw materials, printing, support machines and operator personnel.
b. Turn on the induction kitchen, and wait until the induction kitchen is on for ±10 minutes.
c. Inserting raw materials into the fusion kitchen. During the course of the air burial the air blower remains blown until the metal becomes liquid follow as picture below.

Picture 3.8. Liquefaction and Metal Melting Process

d. Then the liquid metal is aged for ± 2 hours to heat evenly throughout the section.
e. Mix limestone into a metal liquid to remove unburned metallic material, and also add salg to bind dirt so that the metal liquid is clean from dirt and ready for casting.

Induction machine specifications :

i. 2 hours of smelting time
ii. Power required 625 kw
iii. Voltage required 600 volts
iv. Capacity 450 kg

2. Pouring into the mold

After smelting the iron and the mold is ready for use, proceed with the casting process. Pouring using a ladle. The ladle is coated with fireproof stones to keep iron temperatures, and also to strengthen the ladle to retain a very hot metal liquid. In this case it is done manually although the melting process uses induction kitchen. What is noteworthy in the shading process are:

a. The ladle used must be true-dry because if it is not dry because if it is not dry it will lead to a drastic reduction in liquid iron temperature, this may cause the defect of the metal to be formed.

b. The slag formed by the slag above the cast in the ladle should not be removed because it can maintain the temperature of the castings (as ladle cover), as well as the filter at the time of casting, since the slag can still bind the existing slag, as well as the dirt present in the castings.

c. Must maintain the iron temperature of castings so that the result is good by pouring castings for a maximum of 10 minutes, if more than that the cast will be discarded (recycled), because in experience if pouring more than 10 minutes, then the metal formed will tend to be defective.

d. Pouring should be done quickly and precisely. Taking into account the weight and thickness of the castings, it can be assisted by a tool in the form of a bucket of hot-grit sand, with a handle of wood (small ladle) can be carried by one person as in the picture below.

Picture 3.9. Pour the Liquid Metal into the Mold

3. Freezing castings

The freezing of castings starts from the metal parts in contact with the mold, ie when the heat from the molten metal is taken up by the mold so that the metal part in contact with the mold cools to freezing. The inside of the casting cools more slowly than on the outside. For cooling times until the metal ready to be extracted from the mold is varied, depending on the thickness and size of the product made, from the fastest between ±1 hours to the longest ± 24 hours.

4. Dismantling Molds

Dismantling is done by crushing the mold and removing the printed sand until the castings can be processed further, the disassembly is done by beating the mold so that the sand falls off and The sand can still be used for many times.To clean the sand perfectly by using a blast shoot machine, with this machine the surface becomes cleaner with a short time, effective for many products.

3.8. Product Types

PT. Mitra Rekatama independently has been producing by order (job order) and also some products to be thrown into the market. Order product is a component of parts of machinery such as tractor machine, rice milling, and others. There are several list of productions that have been produced by PT. Mitra Rekatama Mandiri, they are :

Product Name	Production Aplication	Picture
Main Pulley YCF	It is a spare part on a tractor machine and is used as a driving force on a tractor machine.	
Main Pulley YM 70	This product is one component of diesel engine to drive v-belt on diesel engine, while code Ym 70 explains that the pulley has diameter 70 with Ym production code specification.	

Engine Pulley YST	It is a spare part on the tractor machine while the YST code is the production code of the company.	
Main Plat YMM	Is one of spare part of paddy thresher machine.	

Table 3.10. Product Types

3.9. Finishing

Metal casting results can be done in the sun finishing division by using machinery into finished goods (ready for use). The finishing process. For machinery process includes machining with slurry machine, drilling machine, grinding machine and other tooling tools. In the machining process to measure the dimensions that have been formed specifically measure in order by the customer and examples of finished goods would be a sample for the manufacture of the next product. For the first is welding and putty, the items requiring the connection or joining of two components are carried out by welding. While the items contained small defects are used putty, suppose there is a small hole in the object. In certain parts used putty as the basis of painting. The second one is Painting, after the product of castings into finished products is done painting that aims to protect the goods or products from rust. The last is checking the quality of the final product, In the final stages in order that the results of machining castings made to meet the quality standards of consumers then performed a final check. Products that do not meet the quality standard then used as raw materials.

3.10. Production Layout

Layout or arrangement of production facilities and work areas is a problem that is often encountered in the industrial world. We can not avoid it, even if we just set the equipment or the machine inside the building which is in small and simple scope.

Layout is the foundation of a major industry. The plant layout or facility layout can be defined as a regulation of plant facility facilities to support the production process. In the layout of the factory there are two things that are set the location of the machine settings (machine layout) and the arrangement of departments within the company / factory (depertment layout). Broadly speaking the main objective of the plant layout is to arrange the most economical work area and product facilities to operate safe and comfortable production so as to raise the morale of work and performance of the operator.

There are five kinds or types or layout that are classically commonly applied in layout design, they are:

1. The facility layout based on the flow of the production process can be defined as the method of measuring and placing all necessary production facilities into a department in particular. With the layout according to this type a product can be done to finish within the department without moving to another department. Here the raw materials will be moved from one operation to the next directly. From this it can be deduced that the general purpose of the ibni layout is to reduce the process of moving raw materials and also facilitate control in production activities.
2. Facility layout based on fixed materials.
3. Plant layouts based on fixed material processes or major product components will stay fixed or major product components will remain in their position or location while production facilities such as machinery, humans and other small components will move towards the location of the material or components of the product on the assembly process, then this type of layout is often encountered because other work equipment will be quite easy to move.
4. Facilities layout by product (family layout or group technology layout)
5. The layout of this type is based on grouping of products to be created. Non-identical products are grouped according to the steps of processing, form, machine or equipment used and so on. Here the grouping is not based on the similarity of the final product type. In this type, the machine or product facility will

also be grouped and placed in a manufacturing cell. Because each product group (family product) will have a high process sequence in the manufacturing process.

6. Fuction Layout process

Facility layout based on the function or kind of process is the method of placement and placement of all machines and production equipment that have the same type into a department. In general, the planned layout will contribute to efficiency, and in some cases will also determine the survival or success of work in an industry. The layout of PT. Mitra Rekatama Mandiri takes the form of a layout process because equipment is structured according to function.

3.11. Production Process Equipment

In the production process, necessary tools as the main tool or as a tool to facilitate the works in the production process. The equipment used in PT. Mitra Rekatama Mandiri, can be grouped into several groups either driven by motor or manual.

- **Equipment On Printing Process**

  There are several types of tools used in the mold making process, among others:

  - Printing frame

    The printed framework consists of a coup and a drag that serves as a large delimiter or as a result mold is made.
  - The pounder

    Pounding serves as a tool to solidify the sand that there is a printed frame.
  - Sand spoon

    Sand spoons serve as a means to pick up a small amount of printed sand to patch up defective and smoothing mold parts.
  - The astigmatic rod

    The cylindrical trunk serves to form the channels of msuk and the outlet.

- **Equipment at the Melting and Pouring Process**

The equipment used in the melting process using induction kitchen is quite a lot so that it can be simply divided into two, which is :

- Equipment related to the smoothness of the production process

In order for the melting process to run properly then supporting equipment should be available also the tools include:

a. Label large, serves to transport or move the molten metal pour into the mold (usually used to pour the mold with a large size).
b. Small label, serves to transport or move pour liquid metal from large labels into molds (usually for small print sizes).
c. Shovels of raw materials, used to take raw materials either primary or lime enhancer.
d. Spade slag, used to remove the slag from the kitchen.
e. Thrusters and batons, used to push and pound raw materials into the kitchen.

The tools mentioned above can function well in order to launch in the production process.

- Security-related equipment

The electric kitchen's safety and equipment need to be well maintained. Before the operation of the kitchen needs to be ascertained the condition whether or not the equipment, equipment such as:

a. Ground (ground detector)

It is an equipment to remove excess current associated with soil.

b. Automatic sensor

It is a tool that works automatically, in case of damage to panel and kitchen automatically this equipment will turn off operation of kitchen and its equipment.

- Equipment of Transportation

Lifting equipment used by PT. Mitra Rekatama Mandiri is a creane overhead, this equipment serves to a transporting work equipment or workpiece prints and the second one is to moving equipment from one place to another in one room.

The specifications of the creane overhead are:

a. Capital / LUT : ES2B / 500
b. Series : 9592
c. Lifting capacity : 4.3 m / min, fo Hz m / min, 60 Hz
d. Hook type : Single
e. Number of Chakras : 2
f. Made : Fito Coorp Japan

- Final work equipment

Final work includes workmanship with machine and workmanship with human hands. Workmanship with Machine bubut : this machine is used to flatten the surface of the field and the casting object diameter to fit the planning. The specifications of the drilling machine are :

a. Brand : KAO-MING
b. Model : KMR / 980S
   9"3600 rpm
c. Size : 180 x 6 x 2
d. Speech : A 24 A
e. Lot No : 709012
f. Made in : Japan

- Equipment for Repairing castings

Repairing of castings is done for casting objects with minor damage and may still be repaired. Such improvements may include adding to a defective spot by means of electric welding or using a coating. The equipment used in the repair of these castings are:

a. Gloves and welding mask, used to protect the face from welding light and hot metal weld sparks.
b. Welding hammer, as a bat.

3.12. Maintenance

Maintenance of the machine made in Pt. Mitra Mandiri Mandiri there are three types:

i. *Preventive Maintenance*, which is a maintenance action that aims to prevent the occurrence of damage that tendency damage can be estimated. In general, preventive maintenance measures are performed on a scheduled basis. Includes lubricant replacement and sub-system adjustment.
ii. *Breakdown Maintenance,* which is the maintenance action done when the machine already damaged. Type of damage can be divided into two, they are major damage (major) and minor damage (minor).
iii. *Predictive Maintenance*, this predictive treatment is done to examine both the physical as well as the functionality of the equipment system. Usually predictive treatments are performed with the help of the five senses or the sophisticated monitors.

Machine maintenance is performed by the maintenance department and each operator uses masin and production equipment that performs routine checks and acts as the first technician in case of minor damage.

CHAPTER IV
REVIEW STUDENT WORK

This section discusses about the review student work during doing the internship for one month at PT. Mitra Rekatama Mandiri Klaten.

4.1. Scope of Work

The scope of work for students of practical work at PT. Mitra Rekatama Mandiri is placed by Drs. Ja'far Yusuf where he is also as well as a field guide for students of practical work in the company. At the beginning I was accepted as a student of practical work at the company I was accompanied by Drs. Ja'far Yusuf for the introduction of each division of the production floor.

For the layout production room of PT. Mitra Rekatama Mandiri has a production process of metal casting and machinery is divided into five production units. The units have their respective functions. The first production unit for ready-to-ship products to the first consumer and engine room, ie for grade B products (medium grade level), second production unit is second machining space, machining process for products having grade A (good grade), the third production unit is the first machining room for grade B products, the fourth production unit is the metal casting room, the fifth production unit is the raw material smelting for further metal casting process.

On my first day in the casting room division as well as the induction kitchen, where this division is a very important division because induction kitchen is the beginning of the process of raw material smelting, there also is the initial process of the production of metal casting. The composition of the raw materials to be melted depends on the type of product to be produced. At PT. Mitra Rekatama Mandiri, the process of once melting of raw materials is done for approximately one to two hours, or to get the desired liquid metal results and the weight of the liquid metal obtained is around 500 kg and will be used to cast various forms of castings. Metal smelting process at PT. Mitra Rekatama Mandiri is a day can be done for 3 to 4 times metal smelting.

Pouring metal, is the process involves the pouring step of liquid metal from the induction kitchen to the large ladle, and from the large ladle to be distributed to the small ladles, then newly processed casting or metal casting from the small ladle to the prepared castings. The molten metal will not experience a drastic reduction in temperature during the process of moving the liquid metal from the induction kitchen to the casting channels of approximately 20 minutes.

The process of unloading the castings. This is the last stage in the process of metal casting. Objects obtained after casting the casting process into the pour channel. After wait until the temperature decreases, then the mold is dismantled to retrieve the object of the castings.

After this stage, the casting object is then done the process of finishing part in the division of machinery to get the results of a neat cast and in accordance with the standards.

4.2. Responsabilities and Work Authority

As a field companion Drs. Ja'far Yusuf gave me the opportunity to wonder to the workers in the induction kitchen to better understand my understanding of the molding of logan from making the initial mold, the process of smelting metal, to the pouring of the smelting of logan and waiting for the dismantling of ready-made castings. The responsibility given to me is to wait for the process of casting the metal into the mold to the dismantling of the castings and to record and calculate the results of the castings. After finishing the calculation then the objects are collected and inserted into the car to be delivered to the machiner or finishing part to get the resulto castings according to standard order, for example it is possible to turn, milling or get a smooth surface.

4.3. Work Implementation Methodology

For implementation methodology work in PT. Mitra Rekatama Mandiri starts working with the time and conditions that have been applied in the company and follow the all the rules. For practical work, students will go to the field before 07.30 at his or her sub division. In my sub-division is the casting room and induction kitchen, there I will observe the making of molds, metal smelting and the last is the pouring of liquid into the mold.

This molding process already has several examples of wood molding that has been available, then the mold process is made of sand and black soil available in the room. The frequently used molding frames are wood and metal, where the molded sand is compacted by sand and black soil to form a mold. For the induction kitchen itself has its own work that the workers will turn on electricity to process the smelting of raw materials. At the same time when making the mold then the induction kitchen will be lit for heating process for about 90 minutes, using 3600 watt electricity, and heat from the melting process itself is 1200 degree. The raw material used for the melting

process is; gram, carbon, coconut husk, silicon, slack, and waste production fail. For the figure is 5kg carbon, 1kg silicon. After the raw material has been melted for 1.5 to 2 hours in a large ladle with a weight of ladle ranging from 500 kg, then the metal liquid will be welded from the large ladle by using a lifting aid machine to be poured into small ladles then will be poured again into the mold that has been prepared. For my part that is to observe how the raw material melting process, as well as ask how the melting of raw materials and what is used for melting processes, then I will record all the information that already exists. After all the process has been done then the next is to wait for the liquid metal that has been poured into the mold large and small. The time to wait for the prints to be unloaded or not is based on the long working experience that is for large prints takes about 5 to 7 hours and for small prints it only takes one or two hours.

4.4. Special Task

4.4.1. Backgroung

Marketing is one of the principal activities undertaken by entrepreneurs in their endeavors to sustain their survival, to grow and to profit. The marketing process begins long before the goods are in production and does not end with sales. Company marketing activities should also be able to give satisfaction to the consumer if the business wants to continue, or consumers have a good view of the company.

Marketing includes the business of a company that begins by identifying the needs of the consumer to satisfy, determining the product to be produced, determining the price of the appropriate product, determining the ways of promotion and the distribution or sale of the product. So, marketing activities are activities that are interconnected as a system.

PT. Mitra Rekatama Mandiri in selling its products using credit or cash sales system. Credit period granted by the company maximum of two months after the order goods sent or received by the buyer. sales system applied by PT. Mitra Rekatama Mandiri is channeled directly to consumers, in addition there are also direct consumers to the company. The marketing area covers Klaten, Semarang, Tegal, Gresik, Surabaya, Jakarta and Tanggerang.

4.4.2. Distribution Process

Distribution process is one part of marketing company that aims to facilitate in distributing the product to the consumer. In distributing their products to consumers that can still be reached, such as Klaten, Semarang, Tegal, Gresik, Surabaya, Jakarta and Tanggerang, the company directly distribute itself without retailers. There are also consumers who come directly to the company to buy their own.

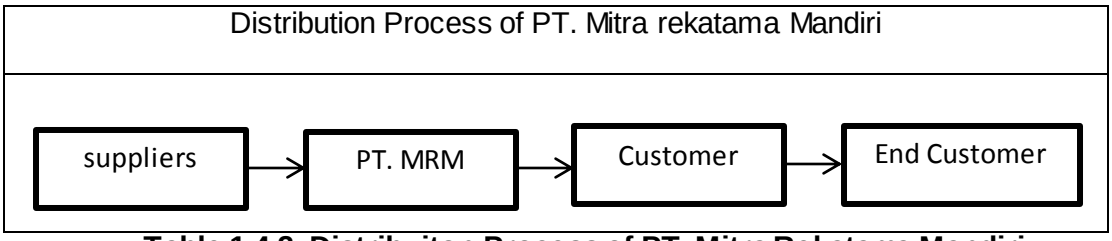


Table 1.4.2. Distribuiton Process of PT. Mitra Rekatama Mandiri

4.4.3. Brief Explain of Failure Mode Effects Analysis (FMEA)

Failure modes and effects analysis (FMEA) is a step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service. FMEA defines the term "failure mode" to identify defects or errors, potential or actual, in a product design or process, with emphasis on those affecting the customer or end user. A "failure effect" is the result of a failure mode on the product or system function as perceived by the user. Failure effects can be described in terms of what the end user may see or experience. The study of consequences of identified failures is called effects analysis. FMEA prioritizes failures according to severity, frequency and detectability. Severity describes the seriousness of failure consequences. Frequency describes how often failures canoccur. Detectability refers to degree of difficulty in detecting failures.

4.4.4. Process Steps of Failure Mode Effects Analysis (FMEA)

There are five steps to conduct the Failure Mode Effects Analysis (FMEA) Is to Identify potential failures and effects**.** The first FMEA step is to analyze functional requirements and their effects to identify all failure modes. Examples: warping, electrical short circuit, oxidation, fracture.

Failure modes in one component can induce them in others. List all failure modes per function in technical terms, considering the ultimate effect(s) of each failure mode and noting the failure effect(s).

Examples of failure effects include: overheating, noise, abnormal shutdown, user injury.

i. Determine severity

Severity is the seriousness of failure consequences of failure effects. Usual practice rates failure effect severity (S) on a scale of one to 10 where one is lowest severity and 10 is highest. The following table shows typical FMEA severity ratings and their meanings:

Rating	Meaning
1	No effect, no danger
2	Very minor - usually noticed only by discrimination or very observant users
3	Minor - only minor part of the systm affected, noticed by average users
4-6	Moderate – most users are inconvenienced and/or annoyed
7-8	High – loss of primary function, users are dissastified

9-10	Very high – hazardous, product becomes inoperative, customers angered. Failure constitutes a safety hzard and can cause injury or death.

Table 1.4.4 (i). Determine Severity

ii. Gauge likelihood of occurrence

Examine cause(s) of each failure mode and how often failure occurs. Look at similar processes or products and their documented failure modes. All potential failure causes should be identified and documented in technical terms. Failure causes are often indicative of weaknesses in the design. Examples of causes include: incorrect algorithm, insufficient or excess voltage, operating environment too hot, cold, humid, etc. Failure modes are assigned an occurrence ranking (O), again from one to 10, as shown in the following table.

Rating	Meaning
1	No documented failures on similar products or process
2-3	Low – relatively few failures
4-6	Moderate – some occasional failures
7-8	High – repeated failures
9-10	Very high – failure is almost certain
9-10	Very high–hazardous, product becomes inoperative, customers angered. Failure constitutes a safety hazard and can cause injury or death.

Table 1.4.4 (ii). Table of Occurance

iii. Failure detection

After remedial actions are determined, they should be testedfor efficacy and efficiency. Also, the design should be verifiedand inspections procedures specified.

- Engineers inspect current system controls that prevent failure mode occurrence, or detect failures before they impact the user/customer.
- Identify techniques used with similar products/systems to detect failures.

These steps enable engineers to determine the likelihood of identifying or detecting failures. Then, each combination from steps one and two is assigned a detection value (D), which indicates how likely it is that failures will be detected, and ranks the ability of identified actions to remedy or remove defects or detect failures. The higher the value of D, the more likely the failure will not be detected.

Rating	Meaning
1	Fault is certain to be caught by testing
2	Fault almost certain to be caught by testing
3	High probability that test will catch fault
4-6	Moderate probability that testswill catch fault
7-8	Low probability that tests will catch fault
9-10	Fault will be passed undetected to user/customers

Table 1.4.4 (iv). Failure Detection

iv. Risk priority number (RPN)

After the foregoing basic steps, risk assessors calculate Risk Priority Numbers (RPNs). These influence the choice of action against failure modes. RPN is calculated from the values of S, O and D as follows:

RPN = S * O * D (or RPN = S x O x D)

RPN should be calculated for the entire design and/or process and documented in the FMEA. Results should reveal the most problematic areas, and the highest RPNs should get highest priority for corrective measures. These measures can include a variety of actions: new inspections, tests or procedures, design changes, different components, added redundancy, modified limits, etc. Goals of corrective measures include, in order of desirability:

- Eliminate failure modes (some are more preventable than others)
- Minimize the severity of failure modes
- Reduce the occurrence of failure modes
- Improve detection of failure modes

When corrective measures are implemented, RPN is calculated again and the results documented in the FMEA.

RPN = S * O * D (or RPN = S x O x D)

Information :

RPN : Risk Priority Number
S : Severity
O : Occurrence
D : Detection

4.5. Data Collection

Based on the observations of the production process Pt. Mitra Rekatama Mandiri, Shows that the some types of defective products that often occurred are :

1. The air cavity

Air cavities may appear as pits on the surface or in the casting, especially a little below the surface which is rounded cavities.

2. Depreciation

There are two categories of depreciation:

- Internal Depreciation : is a defect hole caused due to the reduction that occurs when the metal freezes.
- External Depresiation : is the shrinkage that provide holes on the external surface of castings, due to shrinkage in the molten metal solidification. There are few cast iron products were damaged during the months of December 2017 , can be seen in the following table.

Data Collection during December 2017						Types defects		
No	**Date**	**SHIP**	**Amount of Production**	**Tip**	**Product Defect**	**A**	**B**	**C**
1	1-Dec-17	1	11101	2	1	1		
		2	20997	4	7	3	4	
2	4-Dec-17	1	9221	2	1	1		
		2	21687	4	7	3	4	
3	5-Dec-17	1	11029	2	9	5	2	2
		2	18569	4	9	4	5	
4	6-Dec-17	1	17328	3	8	2	4	2
		2	20652	4	2	2		
5	7-Dec-17	1	23881	4	1	1		
		2	23736	4	6	3	3	
6	8-Dec-17	1	18377	3	7	2	4	1
		2	18939	3	9	3	2	4
7	9-Dec-17	1	17856	3	6	2	2	2
		2	17294	3	4	1	3	
8	11-Dec-17	1	21482	4	2		2	
		2	18192	4	2			2
9	12-Dec-17	1	22624	4	4	1	2	1
		2	18188	4	8	3	4	
10	13-Dec-17	1	22195	4	5	2		3
		2	16172	3	2	1		1
11	14-Dec-17	1	26502	5	2	1	1	
		2	15058	3	8	3	2	3
12	15-Dec-17	1	5697	1	7	4	2	

		2	15833	3	3	1		2
13	16-Dec-17	1	34804	6	4	2		2
		2	3389	6	9	3	4	2
14	18-Dec-17	1	19715	3	5	3	2	
		2	21723	4	3	2	1	
15	19-Dec-17	1	5496	1	6	3		3
		2	21305	4	5	2	1	3
16	20-Dec-17	1	19395	4	5	3	2	
		2	16570	3	0			
16	21-Dec-17	1	19114	4	4	2	2	
		2	22432	4	2	2		
17	22-Dec-17	1	10229	2	9	4		5
		2	33743	6	3	3		
18	23-Dec-17	1	21507	4	7	4		2
		2	29585	6	5	3		2
18	25-Dec-17	1	25228	4	8	4	4	
		2	22249	4	9	3	5	1
19	26-Dec-17	1	22625	4	5	4	1	
		2	23082	4	2		2	
20	27-Dec-17	1	27586	4	6	1	3	2
		2	24749	5	9	1	5	3
21	28-Dec-17	1	25380	4	0			
		2	25646	4	6	1	3	2
22	29-Dec-17	1	27305	5	5		4	1
		2	17861	3	1			1
23	30-Dec-17	1	18514	3	4		2	2
		2	25414	4	4		3	1
Total		75	997256	185	246	99	90	55

Table 4.5. Production data during December 2017

The data collection that giving by the PT. Mitra Rekatama Mandiri is for 1 month during December, 04/2017 until the end of the December, 30/2017. The total products that produced during this period is 997256 products and they got 246 defect products with several types of defected.

4.6. Processing Data by Using Failure Mode Effects Analysis (FMEA)

After data is collected then the next step is to use FMEA or the Failure Mode Analysis method to find out what causes the defective product and also how to identify all possible failures in the design, manufacture or assembly process, product or service. As we already know the cause of the failure of the product, and how frequent failure of the product then we will know how to prioritize products that should be prioritized based on Failure Mode Effects Analysis method.

Date	Amount of Production	Product Defect	A	B	C
1-Dec-17	11101	1	1		
	20997	7	3	4	
4-Dec-17	9221	1	1		
	21687	7	3	4	
5-Dec-17	11029	9	5	2	2
	18569	9	4	5	
6-Dec-17	17328	8	2	4	2
	20652	2	2		
7-Dec-17	23881	1	1		
	23736	6	3	3	
8-Dec-17	18377	7	2	4	1
	18939	9	3	2	4
9-Dec-17	17856	6	2	2	2
	17294	4	1	3	
11-Dec-17	21482	2		2	
	18192	2			2
12-Dec-17	22624	4	1	2	1
	18188	8	3	4	
13-Dec-17	22195	5	2		3
	16172	2	1		1
14-Dec-17	26502	2	1	1	
	15058	8	3	2	3
15-Dec-17	5697	7	4	2	
	15833	3	1		2
16-Dec-17	34804	4	2		2
	3389	9	3	4	2
18-Dec-17	19715	5	3	2	
	21723	3	2	1	
19-Dec-17	5496	6	3		3
	21305	5	2	1	3
20-Dec-17	19395	5	3	2	
	16570	0			
21-Dec-17	19114	4	2	2	
	22432	2	2		
22-Dec-17	10229	9	4		5
	33743	3	3		
23-Dec-17	21507	7	4		2
	29585	5	3		2

25-Dec-17	25228	8	4	4	
	22249	9	3	5	1
26-Dec-17	22625	5	4	1	
	23082	2		2	
27-Dec-17	27586	6	1	3	2
	24749	9	1	5	3
28-Dec-17	25380	0			
	25646	6	1	3	2
29-Dec-17	27305	5		4	1
	17861	1			1
30-Dec-17	18514	4		2	2
	25414	4		3	1
Total	997256	246	99	90	55

When the products defects already conclude than here is a description of defects information that is often used by PT. Mitra Rekatama Mandiri as one of the guidelines to know products defects which is :

Defect Information
A. Lepot
B. Rantap
C. Kropos
D. Mengsle
E. Gelombang
F. Benjol
G. Ngangkat
H. Brontok
I. Delpis
J. Jebol
Total Defect Information
A= 99 Products Defects
B= 90 Products Defect
C= 55 Products Defects

4.7. Conduct the Data by Using Failure Mode Effects Analysis (FMEA)

The first data is caused by product failure in the form of Lepot, Rantap, Cropos product type. This type of Lepot, Rantap and Cropos product often experiences unsatisfactory product results with the types of failed products that often occur in the severity is without effect and not too dangerous, very minor or usually noticed by discriminating users or very observant and the last is the failure is only the most user uncomfortable and/or disturbed. For Occurance part of the most common mistake is that there is no failure documented by the worker on a similar product or process so that errors are so

common then, low errors or relatively few failures occur and the last is a moderate error of some occasional failures by the workers. For the Detection is a very important part also because it becomes one of the factors determining whether our product meets marketing standards or not. The most common part of the error in this detection is that the error will be caught by testing so that it will be fixed soon, then the error is almost or definitely caught by testing. And the last is risk perferance number is the result from severity,occurance and detection data calculation. Theres the table for the data.

4.7.1. Data Calculation Products Defects Lepot

The result of this products defects Lepot as we can see, three potential failure modes have been identified. Failure mode that calculate by RPN of 12,16,18,24,27 and is therefore the highest priority for process improvement.

PD	A	FM	S	O	D	RPN
			Rate 1-10 and 10 is most severe	Rate 1-10 and 10 is highest probability	Rate 1-10 adnd 10 is LowestProbability	SxOxD
1	1	Lepot	2	1	1	2
7	3	Lepot	2	1	2	4
1	1	Lepot	3	2	3	18
7	3	Lepot	1	2	3	6
9	5	Lepot	1	2	2	4
9	4	Lepot	3	3	1	9
8	2	Lepot	3	1	1	3
2	2	Lepot	3	3	2	18
1	1	Lepot	1	2	3	6
6	3	Lepot	3	3	3	27
7	2	Lepot	1	2	2	4
9	3	Lepot	1	1	1	1
6	2	Lepot	3	3	2	18
4	1	Lepot	1	2	2	4
2		Lepot	4	3	2	24
2		Lepot	3	2	1	6
4	1	Lepot	1	3	1	3
8	3	Lepot	2	1	2	4
5	2	Lepot	1	3	3	9
2	1	Lepot	3	4	1	12
2	1	Lepot	4	2	1	8
8	3	Lepot	2	4	2	16
7	4	Lepot	1	1	2	2
3	1	Lepot	4	1	3	12
4	2	Lepot	4	2	3	24
9	3	Lepot	3	1	1	3
5	3	Lepot	1	2	1	2
3	2	Lepot	4	1	2	8
6	3	Lepot	2	1	1	2
5	2	Lepot	2	3	2	12
5	3	Lepot	2	2	2	8
0		Lepot	2	1	1	2
4	2	Lepot	1	2	1	2
2	2	Lepot	4	3	2	24
9	4	Lepot	1	2	1	2
3	3	Lepot	1	3	3	9
7	4	Lepot	2	3	1	6
5	3	Lepot	1	3	3	9
8	4	Lepot	1	2	1	2
9	3	Lepot	2	3	2	12
5	4	Lepot	1	2	3	6
2		Lepot	2	3	1	6
6	1	Lepot	4	2	2	16
9	1	Lepot	2	2	3	12
0		Lepot	4	3	1	12
6	1	Lepot	1	4	2	8
5		Lepot	1	3	3	9
1		Lepot	4	4	1	16
4		Lepot	2	2	2	8
4		Lepot	2	3	3	18
		Total	109	114	94	458

Table 4.7.1. Data Calculation Products Defects Lepot

4.7.2. Data Calculation Products Defects Rantap

The result of this products defects Rantap as we can see, three potential failure modes have been identified. Failure mode that calculate by RPN from 12,16,18,24,27 and is therefore the highest priority for process improvement.

PD	B	FM	S	O	D	RPN
			Rate 1-10 and 10 is most severe	Rate 1-10 and 10 is highest probability	Rate 1-10 adnd 10 is LowestProbability	SxOxD
1		Rantap	2	1	1	2
7	4	Rantap	2	1	2	4
1		Rantap	3	2	2	12
7	4	Rantap	3	2	1	6
9	2	Rantap	3	2	2	12
9	5	Rantap	3	2	1	6
8	4	Rantap	3	2	1	6
2		Rantap	3	2	2	12
1		Rantap	2	3	1	6
6	3	Rantap	2	3	1	6
7	4	Rantap	2	2	2	8
9	2	Rantap	2	2	1	4
6	2	Rantap	2	3	2	12
4	3	Rantap	3	2	2	12
2	2	Rantap	3	3	2	18
2		Rantap	3	2	1	6
4	2	Rantap	3	2	1	6
8	4	Rantap	3	2	2	12
5		Rantap	3	3	1	9
2		Rantap	3	3	1	9
2	1	Rantap	3	2	1	6
8	2	Rantap	3	3	2	18
7	2	Rantap	3	2	2	12
3		Rantap	2	3	1	6
4		Rantap	2	3	1	6
9	4	Rantap	2	3	1	6
5	2	Rantap	2	3	1	6
3	1	Rantap	2	4	2	16
6		Rantap	2	2	1	4
5	1	Rantap	2	2	2	8
5	2	Rantap	2	4	2	16
0		Rantap	2	1	1	2
4	2	Rantap	2	2	1	4
2		Rantap	4	2	2	16
9		Rantap	4	2	1	8
3		Rantap	4	3	2	24
7		Rantap	2	4	1	8
5		Rantap	2	3	1	6
8	4	Rantap	2	3	1	6
9	5	Rantap	2	3	2	12
5	1	Rantap	3	3	3	27
2	2	Rantap	3	2	1	6
6	3	Rantap	3	2	2	12
9	5	Rantap	3	2	3	18
0		Rantap	4	2	1	8
6	3	Rantap	4	2	2	16
5	4	Rantap	4	2	3	24
1		Rantap	2	4	1	8
4	2	Rantap	2	4	2	16
4	3	Rantap	2	3	3	18
		Total	132	124	78	511

Table 4.7.2. Data Calculation Products Defects Rantap

4.7.3. Data Calculation Products Defects Cropos

The result of this products defects Lepot as we can see, three potential failure modes have been identified. Failure mode that calculate by RPN of 12,18 and is therefore the highest priority for process improvement.

DF	C	FM	S	O	D	RPN
			Rate 1-10 and 10 is most severe	Rate 1-10 and 10 is highest probability	Rate 1-10 adnd 10 is LowestProbability	SxOxD
1		Cropos	0	0	0	0
7		Cropos	0	0	0	0
1		Cropos	0	0	0	0
7	2	Cropos	2	2	3	12
9		Cropos	0	0	0	0
9	2	Cropos	1	2	3	6
8		Cropos	0	0	0	0
2		Cropos	0	0	0	0
1		Cropos	0	0	0	0
6	1	Cropos	3	2	2	12
7	4	Cropos	1	3	2	6
9	2	Cropos	1	1	2	2
6		Cropos	0	0	0	0
4		Cropos	0	0	0	0
2	2	Cropos	2	1	2	4
2	1	Cropos	3	1	1	3
4		Cropos	0	0	0	0
8	3	Cropos	2	2	1	4
5	1	Cropos	1	3	1	3
2		Cropos	0	0	0	0
2	3	Cropos	4	2	1	8
8		Cropos	0	0	0	0
7	2	Cropos	1	1	2	2
3	2	Cropos	3	1	2	6
4	2	Cropos	2	1	3	6
9		Cropos	0	0	0	0
5		Cropos	0	0	0	0
3	3	Cropos	2	2	2	8
6	3	Cropos	2	3	1	6
5		Cropos	0	0	0	0
5		Cropos	0	0	0	0
0		Cropos	0	0	0	0
4		Cropos	0	0	0	0
2	5	Cropos	2	3	2	12
9		Cropos	0	0	0	0
3	2	Cropos	1	3	3	9
7	2	Cropos	2	3	1	6
5		Cropos	0	0	0	0
8	1	Cropos	1	3	1	3
9		Cropos	0	0	0	0
5		Cropos	0	0	0	0
2	2	Cropos	2	3	1	6
6	3	Cropos	3	1	2	6
9		Cropos	0	0	0	0
0	2	Cropos	4	3	1	12
6	1	Cropos	1	4	2	8
5	1	Cropos	2	3	3	18
1	2	Cropos	3	1	1	3
4	1	Cropos	2	2	2	8
4		Cropos	0	0	0	0
		Total	53	56	47	179

Table 4.7.3. Data Calculation Products Defects Cropos