

## Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Diary



Dede Roni<sup>1</sup>, Atika Dwi Arsanti<sup>2</sup>, Elaey Mulia Bulqis<sup>3</sup>, Revryand Alfaridzi<sup>4</sup>, Tri Ngudi Wiyatno<sup>5</sup>

<sup>1,2,3,4,5</sup>Industrial Engineering Study Program, Faculty of Engineering Pelita Bangsa University

**ABSTRACT:** PT. Yili Indonesia Diary is a manufacturing company that produces ice cream under the Joyday brand. The problem that occurs is that there are packaging defects resulting from the packaging machine, namely Multiline Wrapping. Maintenance management is interpreted as an appropriate strategy to manage when maintenance must be carried out on machines. Therefore, the production process in the factory will not be hampered as long as the machine runs smoothly. Preventative maintenance needs to be carried out as the first step so that the machine is always ready to use and can avoid significant damage. The aim of this research is to analyze the implementation of preventive maintenance management on Multiline Wrapping machines. Qualitative research methods were adopted in this research and data were collected through observation, documentation and literature study. The research results explain that the machine maintenance strategy, especially for Multiline Wrapping machines at PT Yili Indonesia Diary, includes, among other things, Preventive Maintenance, Machine Repair, Replacement, and Opportunity Maintenance. Machine maintenance is very important because it can speed up the production process.

**KEYWORDS:** Maintenance Management, Preventive Maintenance, Smooth Production Process

### I. INTRODUCTION

Manufacturing companies are a source of production and provide products that every consumer needs. Therefore, the production results of a company must be of high quality and can also adopt sophisticated machine technology. To produce quality products, industrial companies have to spend a lot of money to buy machines because technology is increasingly developing (Maryulina, 2010). The use of production machines must be optimized because they are one of the production factors. During the production process, the machines used must be in prime condition.

The goods and services produced will be of high quality if they are supported by machines and equipment that are in good condition. For a company, regular care or maintenance on production machines is a strategy in preparing machines/equipment so that they are maintained and remain sustainable (Putra et al., 2020). Care (maintenance) that is carried out well can of course maintain production consistency, of course the company can achieve its targets according to production capacity. So that the machine can operate optimally, to guarantee this, a maintenance or maintenance system is needed on the machine.

Each machine has different characteristics, specifications and functions, therefore the maintenance requirements are also different. Most machines or equipment are required to stop operating, making it easier for maintenance work to run smoothly and produce good results. Of course, determining when or how long a machine will stop operating is also not easy, because each machine has a different level of difficulty.

Machines are tools that are useful in carrying out production activities to produce a product (Lubis, 2021). Whether the production process runs smoothly or not can be determined from the machine used. Because machines are one of the important organs for a company's existence, that is why maintenance is something that should not be missed. Machine maintenance management is interpreted as the right strategy for managing and knowing when a machine needs maintenance. To create quality

## Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Dairy

and competitive products, industrial maintenance management is carried out as a method of regulating activities to maintain production continuity(Kurniawan, 2013).

The key to ensuring that the machines/equipment used in the production process always perform at their best is maintenance that is always carried out regularly and in a planned manner(Lestari, 2022). In this way, the production process will not be disrupted and the machine work process in the factory will continue to run smoothly.

PT. Yili Indonesia Dairy is a manufacturing company that produces ice cream under the Joyday brand. To create high quality ice cream products, PT. Yili Indonesia Dairy combines advanced technology, knowledge and hygienic processes in processing every ingredient used. There are many things you can learn more about the ice cream processing process, starting from preparing the raw materials to becoming a product that is ready to be distributed.

To be able to meet consumer needs, PT. Yili Indonesia Dairy always tries to streamline its production process so that there is no waste in terms of time, costs or worker energy. In fact, there are still problems from various indications that make the production process ineffective and inefficient. One of the problems that occurs in the production process is that there are defects in the product packaging produced from the Multiline Wrapping machine, resulting in a defective product.

**Figure 1.1 Defect Product from Multiline Wrapping Machine at PT. Yili Indonesia Dairy**



**Source:** PT. Yili Indonesia Dairy, 2024

Based on the picture above, it can be seen that there are product defects resulting from the Multiline Wrapping machine components, the End Seal and Center Seal. In the packaging process, the End Seal and Center Seal are very important components because the End Seal has teeth which function to glue the two sides of the plastic packaging together with a heater or heat energy obtained from the machine, while the Center Seal functions to glue the two sides of the packaging in the middle.

The existence of defective products causes companies to experience losses in terms of time, requiring them to spend more on repairs, increasing production costs, so that targets are threatened with not being achieved. To minimize existing problems, steps are needed that can minimize problems that arise so that productivity can be significantly increased. In this case, Preventive Maintenance Management is used as an approach to overcome this problem.

In supporting care or maintenance in the course of the production process, PT. Yili Indonesia Dairy implements maintenance activities on each machine to prevent damage, which is called Preventive Maintenance Management. So that the machines used for production can work optimally, maintenance on the machines supporting the production process must always be carried out regularly and in a planned manner.(Pardiyono & Hartanto, 2019). In this way, the production process will not be hampered because the performance of the machines in the factory runs smoothly.

# Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Dairy

Referring to the background presentation, the problem formulation that can be determined is how to implement preventive maintenance management on the Multiline Wrapping machine at PT Yili Indonesia Dairy so that it is always in a ready-to-use condition to expedite the production process. So this research aims to determine the optimization of the implementation of preventive maintenance management on the Multiline Wrapping machine at PT Yili Indonesia Dairy in streamlining the production process. Thus, it can be understood that conducting this research aims to find out the answer to the problem formulation.

## II. THEORETICAL FOUNDATION

### A. Care Management

The development of machine maintenance started from Preventive Maintenance until it developed into Productive Maintenance. The first to use these two maintenance methods were manufacturing industries in the United States which placed all their activities in one department, namely the maintenance department.

Industrial maintenance management is a step in managing activities to maintain production in a sustainable manner which will create quality products that are competitive with maintenance of industrial machines and facilities. (Kurniawan, 2013).

Maintenance management can be defined as all management activities used to determine goals or priorities, maintenance, strategies and responsibilities (Pranowo, 2019).

Based on several definitions, maintenance management is interpreted as a step or method to produce goods or services through resource management by both companies and organizations by utilizing management functions, namely planning, operating, monitoring and improving operational processes. The broad scope of maintenance management covering manufacturing and services creates ideas about how to optimize input-production-output, or input-transformation-output, by utilizing the company's or organization's own resources.

### B. Care Management Goals

In general, the focus of the maintenance process is aimed at preventing or avoiding damage to machines or equipment by ensuring the level of skill and readiness of technicians and minimizing maintenance costs. (Putra et al., 2020). The following are the main goals of treatment:

- a) Fulfillment of production targets is in line with plans due to production capabilities.
- b) Production process activities are not disturbed, thereby creating high quality products.
- c) Maintenance activities are carried out effectively and efficiently in order to keep maintenance costs low.
- d) Limiting usage and storage and maintaining capital invested in the company in line with company policy for the specified time.
- e) Increasing return of investment or profits which is the company's goal as best as possible and lowest total costs through the establishment of good cooperation between the main functions.

### C. Types of Treatment

#### a) Planned Maintenance (Planned Maintenance)

Planned maintenance is maintenance that has been planned and determined in advance which is carried out in an organized manner with control, recording and thinking into the future. Therefore, the implementation of the maintenance program must be dynamic and requires active supervision and control from the maintenance department through information from machine/equipment historical records.

- Preventive maintenance (Preventive maintenance)

Preventive maintenance is maintenance or maintenance activities to prevent sudden damage from appearing and also to identify conditions or conditions that could result in production machines/equipment being damaged when used during the production process.

That way, production machines/equipment will be ready to use and ensure smooth operation during operations or production processes when all production facilities implement preventive maintenance. (Nasution et al., 2021). Therefore, it is possible to establish appropriate plans and schedules for more planned and careful maintenance and production activities.

- Corrective Maintenance (Corrective maintenance)

Repair maintenance is a maintenance activity that is carried out after a disturbance or damage occurs so that the machine/equipment is not working optimally.

- Predictive maintenance

## **Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Dairy**

Predictive maintenance is a maintenance activity carried out at the time the date is determined after going through predictions of analysis results and evaluation of operational data taken to carry out predictive maintenance, this can be in the form of vibration, vibration, flow rate, temperature and others. Carrying out predictive maintenance refers to submitting data from the field via work orders to the maintenance department to carry out actions carefully and of course without harming the company.

### **b) Unplanned Maintenance (Unplanned Maintenance)**

Unplanned maintenance can also be called emergency maintenance in the form of breakdown / emergency maintenance. Breakdown/emergency maintenance is a reactive activity on machines/equipment that can still operate, until the machine/equipment is damaged and can no longer function. It is hoped that by carrying out this unplanned maintenance, it can extend the useful life and minimize the level of damage to production machines/equipment.

### **c) Independent Maintenance (Autonomous Maintenance)**

Independent maintenance is maintenance or maintenance activities carried out by operators or technicians themselves effectively and efficiently so that machines/equipment can increase productivity.

## **III. RESEARCH METHODOLOGY**

Qualitative research methods were adopted in this research. Qualitative research methods are data produced from research that is more related to the interpretation of data or facts found in the field and the presentation of the data is not in numerical form.(Sugiyono, 2015). This research is written using a case study after determining the writing topic specified in the problem formulation, before searching and collecting the necessary data.

The research was carried out at PT. Yili Indonesia Dairy located in Bekasi Regency, West Java. The study focuses on the Multiline Wrapping machine maintenance process implemented in the company. Data was collected using direct observation techniques at PT. Yili Indonesia Dairy, then supported by relevant sources in the form of books, journals, articles, results of previous research published on the internet.

## **IV. RESEARCH RESULTS AND DISCUSSION**

To keep the machine in good condition, efforts are needed to adopt an approach, one of which is Management Preventive Maintenance. Large-scale companies which in their production processes use large machines with all their functions generally use this approach. Preventive Maintenance Management would be best carried out on a scheduled and routine basis, to check whether the machine is in prime condition or not. This also functions as an anticipatory step if unexpected damage occurs so that it can be resolved immediately and of course the machine's useful life will last longer.

PT. Yili Indonesia Dairy is a subsidiary of the Yili Group which produces processed milk originating from China and is one of the largest in Asia. This ice cream factory located in West Java is capable of producing up to hundreds of tons of Joyday ice cream with various variants a day, of course the machines and equipment used in the production process are heavy machines. For example, Tipping Station Machine, Silo Powder Machine, Blanding Tank, Multiline Wrapping Machine and many other machines. A good maintenance system needs to be implemented to ensure that the machine can run well and optimally. The system implemented at PT. Yili Indonesia is Preventive Maintenance.

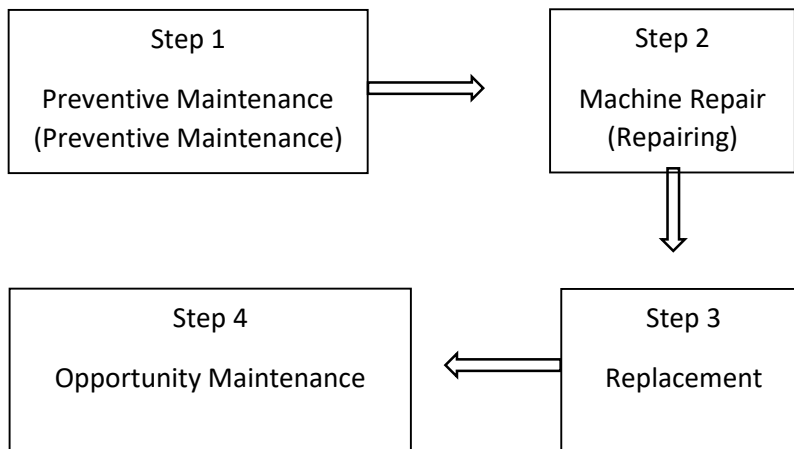
### **Multiline Wrapping Machine Maintenance Strategy at PT Yili Indonesia Dairy**

Maintenance or upkeep of the Multiline Wrapping machine is carried out after every use, namely by means of visual inspection, at intervals for each shift/periodic task. Visual inspection is carried out when the system is operating. All forms of disturbance/damage are contained in the report which will be followed up for maintenance and repair. Carrying out maintenance and performance checks to cleaning machines/equipment usually requires free time which is carried out on a daily, weekly to monthly basis.

The following is a preventive maintenance management strategy carried out at PT Yili Indonesia Dairy:

# Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Dairy

Figure 4.1 Maintenance Management Process Flow



Step 1 Preventive Maintenance, the first step is carried out repeatedly based on the schedule set by the company. If a minor problem occurs, maintenance can be done by giving or adding lubricant/oil to the machine (lubrication). Lubrication functions to prevent friction and wear, of course the engine will always be in good condition.

One of the steps or efforts so that preventive maintenance can be carried out well, the company must create a programmed and coordinated preventive maintenance schedule. It is important to do this to prevent sudden damage and maintain work quality in line with what has been planned. The preventive maintenance schedule is determined based on the working hours of the Multiline Wrapping machine. The purpose of this activity is to maintain safety and sensitive components so that they are not damaged when they are in peak condition.

## Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Diary

Table 4.1 PT Yili Indonesia Diary Maintenance Schedule in the Maintenance Section

Equipment Name	Area	Point Inspection	Check Item	Cycle	
Multiline Wrapping Machine	Molding	output device	Apakah rantai jaringan sabuk konveyor outlet bergetar, dan apakah ada suara abnormal	Setiap minggu	Plan
			Apakah ada kebisingan abnormal dalam pengoperasian sabuk konveyor pemotong, dan apakah		Actual
		End Seal	Apakah sekrup pemasangan kursi pisau atas longgar dan disegel, apakah resistansi tabung pemanas	Setiap Bulan	Plan
			Tidak ada gerakan lamban dari kursi pisau atas dan silinder pemotong, dan apakah ada		Actual
		Up Liner	Apakah gerakan silinder dial kiri dan kanan konsisten, dan dudukan dial tidak goyang	Setiap shift	Plan
					Actual
		Center Seal	Apakah garis Center Seal jelas dan apakah ada Seal yang longgar	Setiap minggu	Plan
			Apakah ada kebocoran udara di silinder dan pipa udara penyegelan panas penyegelan		Actual
		Drive System	Periksa motor penggerak dan peredam setiap stasiun untuk kebocoran oli	Setiap Bulan	Plan
					Actual
		Distributi on Cabinet	Apakah exhaust fan berfungsi dengan baik?	Setiap bulan	Plan
			Apakah exhaust fan bocor bersih?		Actual
			Apakah kipas knalpot dari setiap pengontrol servo berjalan normal	Setiap bulan	Plan
					Actual

Source: PT. Yili Indonesia Diary, 2024

Based on the table above, the following is the maintenance schedule that must be carried out by care/maintenance employees. The parts that must be checked, such as the Output Device, End Seal, Up Liner, Center Seal, Drive System and Distribution Cabinet, have been implemented as they should. The mechanic has checked according to a predetermined schedule, either daily, weekly or monthly. Here it can be seen that if the mechanic does not carry out maintenance, it can increase engine damage to other parts.

Step 2 Repairing (machine repair), the second step after preventative maintenance is carried out, namely continuing with engine repairs. Repair is interpreted as an effort to repair several parts of the machine that are experiencing problems. Repairs can be made at different points during the failure. In this case, technicians noticed that the Multiline Wrapping machine was experiencing downtime. At this point, the component that is experiencing the problem is checked and analyzed to see whether the component can be repaired, adding grease and oil (lubrication) without replacing the component. Or when the component experiences damage that really cannot be repaired, then proceed with the replacement stage of the problematic engine component.

Step 3 Replacement: In the third step, what is done is to replace components or equipment that are damaged or no longer suitable for use. The following is data on Multiline Wrapping machine components that are being replaced at PT Yili Indonesia Diary.

**Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Diary**

**Table 4.2 Multiline Wrapping Machine Components that Perform Replacement**

Mesin	Sub-mesin	Unit fungsional	Bagian	Jumlah unit	Perawatan mingguan	Jumlah/tahun	Jenis perawatan
Multiline Wrapping Machine	End seal	End seal	Cutter silinder	9	1500	4	Penggantian
			Dies silinder	18	6000	1	Penggantian
			Bushings	18	3000	2	Penggantian
			Selang pemanas	36	12000	1	Penggantian
			Heating Element	36	12000	1	Penggantian
			Sensor suhu	11	12000	1	Penggantian
			Plug, Quick-lock 50V	9	12000	1	Penggantian
			Cutter	9	750	8	Penggantian
			Straight fitting	18	6000	1	Penggantian
			Air fittings	18	6000	1	Penggantian
			Valve Block	1	12000	1	Penggantian
Multiline Wrapping Machine	Center seal	Center seal	Collector ring	18	12000	1	Penggantian
			Pressure spring	36	12000	1	Penggantian
			Pipa Pemanas	18	12000	1	Penggantian
			Temperature Suhu	9	12000	1	Penggantian
			Air fitting	9	6000	1	Penggantian
			Sealing wheel piston	9	6000	1	Penggantian
			Drive wheel piston	9	6000	1	Penggantian
			Bearing	36	12000	1	Penggantian
			Bearing	36	12000	1	Penggantian

**Source:** PT. Yili Indonesia Diary, 2024

Based on the table above, the following are several components that require replacement in the End Seal and Center Seal sections. This component is the part that directly causes product packaging to become defective. Component replacement is based on the number of hours the engine has been running. To minimize downtime, replacement scheduling can be included in the weekly shutdown schedule. The following is the maintenance schedule for replacing Multiline Wrapping machine components at PT. Yili Indonesia Diary with the aim of making it easier to control the implementation of component replacement.

# Implementation of Preventive Maintenance Management on Multyline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Diary

**Table 4.3** Components that are replaced based on the length of working hours

No	Bagian	Perawatan mingguan (Jam Ke)	No	Bagian	Perawatan mingguan (Jam Ke)
1	Cutter silinder	1500	11	Valve Block	12000
2	Dies silinder	6000	12	Collector ring	12000
3	Bushings	3000	13	Pressure spring	12000
4	Selang pemanas	12000	14	Pipa Pemanas	12000
5	Heating Element	12000	15	Temperature Suhu	12000
6	Sensor suhu	12000	16	Air fitting	6000
7	Plug, Quick-lock 50V 10.0 A A 插头 · 快锁 50V 10.0 A	12000	17	Sealing wheel piston	6000
8	Cutter	750	18	Drive wheel piston	6000
9	Straight fitting	6000	19	Bearing	12000
10	Air fittings	6000	20	Bearing	12000

**Source:** Data processed by researchers

Step 4 Opportunity Maintenance (Opportunity Maintenance), in the fourth step maintenance is carried out when the machine is in shutdown state. The purpose of opportunity maintenance is to utilize time and avoid idle/wasted time. At PT Yili Indonesia Diary, the simplest maintenance of opportunity maintenance is by cleaning, carrying out inspections on component parts which often cause product defects both by maintenance personnel and operators on production machines which is usually done every 2 days to ensure machine productivity. keeps running smoothly and the machine doesn't get damaged quickly.

## B. The Importance of Machine Maintenance in a Smooth Production Process

In a company, the maintenance function is equal in importance to the production function. Maintenance management is defined as managing the maintenance of machines/equipment so that they remain ready for use. The production process is a method or method that uses machines/equipment in its activities, so that it can process input or input into output or output in the form of goods or services, which can finally be distributed to consumers according to their needs so that the company can take the expected profits.

Maintenance and smooth production should have a close relationship, because maintenance can ensure the smooth running of the production process. This means that when maintenance activities are carried out poorly, there will be disruption when the machine/equipment is used and the production process will be hampered. This is in line with research carried out by Habib Rolanda Putra (2020) which states that machine maintenance on the smoothness of the production process has a significant influence on the production process, this is because the number of machine down times is very high.

The negative thing for the company is when the machine experiences problems, such as disrupting the smooth production process, resulting in long production times so that there will be delays when the production results are distributed to consumers.

So, the relationship and link between maintenance and the smooth running of the production process is very close, meaning that if the machine/equipment used in the production process activities is damaged or not functioning then the ice cream production from PT. Yili Indonesia Diary cannot achieve the target, of course losses will be experienced by the company.



# Implementation of Preventive Maintenance Management on Multiline Wrapping Machines to Squirt the Production Process at PT Yili Indonesia Diary

## V. CONCLUSION

Based on the presentation of research results and discussion, the following are the conclusions obtained:

1. Multiline Wrapping machine maintenance carried out at PT. Yili Indonesia Diary, namely the first stage is carried out with preventive maintenance, the second stage is carried out by replacing components when damage occurs and the second stage is carried out with opportunity maintenance.
2. The level of smoothness of the production process at PT. Yili Indonesia Diary experiences fluctuations, this can be seen from the company's target achievements which often experience damage to the packaging, resulting in defective products.
3. As for the maintenance of the Multiline Wrapping machine at PT. Yili Indonesia Diary aims to expedite the production process, basically so that the machine is always ready to use, minimizes damage to production activities and through maintenance can maintain the utility of the machine, of course it can minimize maintenance costs.

## VI. SUGGESTION

Based on the results of the explanation above, the author realizes that there are shortcomings and limitations in this research. However, it is hoped that this research will have a good impact on companies, especially in implementing preventive maintenance. Here are some suggestions from researchers:

1. Company  
For the companies that are the research sites, the researchers hope that this can be taken into consideration to better optimize the implementation of preventive maintenance.
2. Academic  
For academics, this research can be used for knowledge, reference or comparison for further research. For future researchers, the researchers hope to be able to deepen and expand in order to obtain new phenomena and knowledge related to the application of preventive maintenance management on production machines.

## BIBLIOGRAPHY

- 1) Kurniawan, F. (2013). *Industrial Maintenance Management*. Beta Books: Yogyakarta.
- 2) Lestari, KI (2022). *Evaluation of Heavy Equipment Maintenance Management at PT. United Tractors in Pekanbaru*. Riau Islamic University.
- 3) Lubis, MFI (2021). *Implementation of Preventive Maintenance on Production Machines to Increase Machine Reliability Using the Reability Centered Maintenance (RCM) Method*. Indonesian Islamic University.
- 4) Maryulina, A. (2010). *Analysis of Production Machine Maintenance at PT. Bangkinang P&P in Simalinyang Village*. Sulthan Syarif Kasim Riau State Islamic University.
- 5) Nasution, M., Bukhori, A., & Novarika, W. (2021). *Benefits of the Need for Maintenance Management for Workshops and Industries*. *Engineering Main Bulletin*, 3814, 248–252.
- 6) Pardiyo, R., & Hartanto, T. (2019). *Proposed Preventive Maintenance of Critical Components on High Pressure Pump Machines at Pt. Dian Swasetika Sentosa Using the Group Replacement Method*. *Infomatech*, 21(2), 117–126. <https://doi.org/10.23969/infomatek.v21i2.1985>
- 7) Pranowo, ID (2019). *Maintenance Systems and Management*. CV Budi Utama.
- 8) Putra, ND, Saleh, HHM, & Asngadi, A. (2020). *Analysis of Production Machine Maintenance at Pt. Haycarb Palu Mitra*. *Tadulako University Management Science Journal (JIMUT)*, 5(1), 61–68. <https://doi.org/10.22487/jimut.v5i1.139>
- 9) Sugiyono. (2015). *Quantitative, Qualitative and R&D Research Methods (22nd ed.)*. Alfabet.



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0)

(<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.