

IDENTIFICATION OF THRESHER MAINTENANCE MECHANISMS IN A PALM OIL PROCESSING PLANT AT PT. BEURATA SUBUR PERSADA (BSP), NAGAN RAYA

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Abstract

In the era of globalization, industrial development requires companies to maintain efficient and sustainable production systems. One of the critical components in palm oil processing is the thresher machine, which functions to separate fruits from fresh fruit bunches (FFB). This study aims to analyze the maintenance mechanism of the thresher machine at PT. Beurata Subur Persada using a qualitative descriptive approach. Data were collected through interviews, direct observations, and literature studies. The results show that the thresher machine plays a vital role in ensuring the continuity of the production process, and its performance is highly dependent on proper maintenance practices. The company implements a preventive maintenance system consisting of routine, weekly, monthly, and annual activities, including inspection, cleaning, repair, and component replacement. These maintenance practices have proven effective in improving machine reliability, extending component service life, and minimizing unexpected failures. However, several challenges remain, such as component wear, potential leakage, and insufficient maintenance documentation. Therefore, improvements in maintenance management, including systematic recording, enhanced monitoring, and workforce training, are necessary to optimize machine performance. Overall, effective preventive maintenance contributes significantly to operational efficiency and sustainability in palm oil production.

Keywords: thresher machine, preventive maintenance, palm oil mill, machine reliability, production efficiency

INTRODUCTION

In the current era of globalization, the business world has experienced very rapid growth. A company is a modern organization that carries out production activities of goods or services to achieve its objectives, including trading companies (merchandising), service companies, and manufacturing companies. In general, the primary objective of a company is to generate profit in the form of long-term earnings growth, maintain business sustainability, and build a positive public image that contributes to the advancement of the national economy of Indonesia (Nirawati et al., 2022).

PT. Beurata Subur Persada is a company engaged in palm oil processing, located in Babah Dua Village, Tadu Raya Subdistrict, Nagan Raya Regency, Aceh Province. The company was established on February 15, 2007, under Law No. 20 of 2007. PT. Beurata Subur Persada operates several processing stations in its palm oil mill, including the boiler station, which functions to generate energy in the form of pressurized steam; the sterilizer station, which is used to cook or boil fresh fruit bunches (FFB) to facilitate the pressing process; and the powerhouse station, which serves as the electricity generation unit for operational needs.

The thresher is a machine used to separate palm fruits from bunches by repeatedly striking the sterilized fresh fruit bunches (FFB) inside a rotating drum. This thresher consists of a cylindrical drum with a diameter of 210 cm and a length of 590 cm, rotating horizontally at a constant speed of approximately 23–24 rpm (Kasmawati et al., 2025; Yufrizal et al., 2024). The drum is designed with grates spaced between 40 mm and 50 mm to allow the fruits to pass through, and it is equipped with strippers that lift the bunches and move them toward the end of the drum so that empty fruit bunches can be

discharged. The thresher has a processing capacity of 40 tons per hour. The thresher station comprises various interconnected components and machinery, all of which are interdependent during operation (Aisyah et al., 2025).

Maintenance is defined as a set of activities required to preserve or restore the quality and functionality of facilities or machinery so that they can operate effectively as intended. It includes a series of actions such as inspection, replenishment of consumable materials, repair, and replacement of machine components (Pranata & Saifudin, 2024). Without proper maintenance, equipment reliability will decline significantly. Conversely, excessive maintenance may lead to increased operational costs. In practice, maintenance activities are often neglected due to the company's reluctance to incur additional expenses. However, the importance of maintenance becomes evident when system failures occur or when equipment can no longer operate properly (Asdiansyah, 2021).

Maintenance activities are aimed at ensuring the functional continuity of a system so that it can produce outputs in accordance with the desired specifications. The maintenance system can be viewed as a reflection of the production system; therefore, when the production system operates at a high capacity, maintenance activities must be carried out more intensively (Ari, 2021; Wijaya et al., 2025).

Maintenance is an activity intended to ensure that facilities or assets are consistently maintained in the desired condition. At PT. Beurata Subur Persada, a preventive maintenance system is implemented. Through this approach, all production facilities that undergo preventive maintenance are ensured to operate smoothly and are maintained in a ready-to-use condition to support continuous production processes at all times.

METHODS

This study employs a qualitative descriptive approach aimed at identifying the maintenance mechanism of the thresher machine in a palm oil mill. Data collection techniques were carried out through several methods, namely interviews, observations, and literature study. Interviews were conducted directly with employees or operators in the field to obtain information related to the process and mechanism of thresher machine maintenance. In addition, observations were performed by directly examining the machine conditions and maintenance activities, including physical inspection of components such as the drum, grates, and conveyor, machine cleanliness, as well as the possibility of leaks or damage. All observation results were recorded for further analysis. Furthermore, a literature study was conducted by collecting various references from books, journals, and other scientific sources to support the theoretical foundation related to machine maintenance and the operational system of the thresher.

RESULTS AND DISCUSSION

The results of the study indicate that the thresher machine plays a very important role in the production process at palm oil mills, particularly in separating fruits from their bunches. The performance of this machine greatly determines the continuity of subsequent processes, making it a key component in the overall production system. Therefore, the operational condition of the machine must always be maintained to avoid disrupting plant productivity.

Based on field observations, the thresher operates using a rotating drum system that functions to repeatedly impact fresh fruit bunches until the fruits are detached. This process involves several key components such as the drum, grates, conveyor, and electromotor, which are integrated and work together. Each component has a supporting role, so any damage to one part can affect the overall performance of the machine.

The results of interviews with operators indicate that the maintenance of the thresher machine in the company is carried out using a preventive maintenance approach. This system aims to prevent damage through scheduled maintenance activities. Maintenance is performed routinely and periodically, including daily, weekly, monthly, and annual activities, depending on the machine's condition and operational needs. Routine maintenance includes inspection and cleaning of main components such as the drum, grates, hub spider, electromotor, and conveyor to ensure the machine operates properly. The details of routine maintenance activities are presented in Table 1.

Table 1. Routine Maintenance of Thresher Machine

No	Component Maintained	Maintenance Action
1	Grates	Inspection of grates condition
2	Hub spider	Inspection of hub spider
3	Electromotor	Checking electromotor condition
4	Drum thresher	Inspection of drum condition
5	Conveyor	Cleaning fiber residues

The routine maintenance activities presented in Table 1 emphasize regular inspection and cleaning of critical components such as the grates, drum, electromotor, and conveyor. These activities are essential to ensure the machine remains in optimal working condition and to detect early signs of wear or potential failure that could disrupt the production process. The implementation of weekly maintenance activities is presented in Table 2.

Table 2. Weekly Maintenance of Thresher Machine

No	Component Maintained	Maintenance Action
1	Auto feeder	Repair chain system
2	Grates and hub spider	Welding and bolt replacement (join shaft, hanger, bushing)
3	Grates and hub spider	Welding and replacement of chain coupling components
4	Grates	Welding of damaged grates

As shown in Table 2, weekly maintenance focuses on minor repair actions, including welding and replacement of worn components such as bolts and chain systems. These activities aim to address small-scale damages promptly, preventing them from developing into more serious mechanical failures.

Table 3. Monthly Maintenance of Thresher Machine

No	Component Maintained	Maintenance Action
1	Bushing	Replacement of bushing
2	Conveyor / Hopper	Inspection and tightening of frame components
3	Machine structure	Checking for leaks
4	Hydraulic system	Checking for leaks
5	Electrical system	Inspection of control panel and indicators

Table 3 illustrates monthly maintenance activities, which involve more comprehensive inspections and corrective actions on structural, hydraulic, and electrical systems. This level of maintenance is crucial for ensuring overall system stability, improving machine reliability, and maintaining consistent operational performance over time.

Table 4. Annual Maintenance of Thresher Machine

No	Component Maintained	Maintenance Action
1	Conveyor / Hopper	Replacement of conveyor parts (every 3 years)
2	Electromotor	Replacement of electromotor (every 12 years)

Table 4 presents annual maintenance activities, which involve major component replacements carried out over longer time intervals, such as the conveyor system and electromotor. These activities are essential to ensure long-term machine reliability, extend the service life of critical components, and prevent major breakdowns that could significantly disrupt production operations.

The discussion reveals that the implementation of preventive maintenance has a positive impact on machine performance, including improved reliability, extended service life, and reduced risk of unexpected failures (Marlina, 2026; Samudera, 2025). However, several challenges were still identified in the field, such as component wear, potential leakage, and suboptimal maintenance record-keeping. Therefore, improvements in the maintenance management system are required, such as implementing more systematic documentation, enhancing monitoring of machine conditions, and providing technical training for workers in handling machine-related issues (Andini, 2024; Mursidi & Sarjito, 2025). With these improvements, it is expected that the effectiveness of thresher machine maintenance can be further enhanced to support efficiency and sustainability in palm oil production processes.

CONCLUSION

The thresher machine plays a crucial role in supporting the smoothness and efficiency of the production process in palm oil mills, particularly in separating fruits from their bunches. The implementation of a preventive maintenance system, which includes routine, weekly, monthly, and annual maintenance activities, has proven effective in maintaining machine performance, improving reliability, and extending the service life of its components. Maintenance activities such as inspection, cleaning, repair, and component replacement contribute significantly to minimizing the risk of unexpected failures. However, several challenges still exist, such as component wear, potential leakage, and suboptimal maintenance record-keeping. Therefore, improvements in maintenance management are required through more systematic documentation, more intensive monitoring, and enhanced workforce competence to ensure that the effectiveness of thresher machine maintenance can be continuously improved and support the sustainability of the production process.

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