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PREVENTIVE MAINTENANCE IN THE COLD SAW AREA AT PT. KBK

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Graphical abstract

Figure 1. Cold Saw

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Abstract

In an increasingly competitive industrial environment, effective maintenance strategies are critical to ensure optimal machine performance and minimize downtime. This report focuses on the implementation of preventive maintenance in the cold saw area at PT. KBK, a steel production company. Preventive maintenance procedures were carried out to sustain machine reliability, particularly focusing on components such as the roll table, bolt coupling motor translation, sliding rails, and hydraulic motors. The report outlines the preventive maintenance schedule, inspection processes, and key findings during the maintenance period. The most frequently encountered issue was the deterioration of the saw blade, affecting cutting quality and operational efficiency. Contributing factors to these issues include human error, material hardness, improper maintenance methods, and machine age. A fishbone diagram analysis was used to determine root causes of failures, highlighting areas for improvement in maintenance practices. The study concludes that consistent preventive maintenance is essential to reduce machine failures, enhance productivity, and improve product quality. Recommendations are provided to enhance the maintenance process, including increased use of personal protective equipment (PPE) and more stringent inspection protocols.

Keywords: Cold Saw, Maintenance Schedule, Preventive Maintenance, Saw Blade.

Abstrak

Strategi pemeliharaan yang efektif sangat penting dalam industri yang semakin kompetitif untuk memastikan kinerja mesin yang optimal dan meminimalkan waktu henti. Fokus penelitian ini adalah penerapan pemeliharaan preventif pada area cold saw di PT. KBK, perusahaan yang bergerak dalam produksi baja. Untuk memastikan keandalan mesin, pemeliharaan preventif dilakukan terutama pada komponen seperti meja rol, penerjemahan motor pengikat baut, rel geser, dan motor hidrolik. Dalam penelitian ini, dibahas jadwal preventif pemeliharaan, prosedur inspeksi, dan temuan penting selama periode pemeliharaan. Kerusakan pada saw blade adalah masalah yang paling umum, berdampak pada kualitas potongan dan efisiensi operasi. Kesalahan manusia, kekerasan material, pemeliharaan yang tidak tepat, dan usia mesin adalah penyebab masalah ini. Dengan menggunakan analisis diagram tulang ikan, akar dapat ditemukan.

Kata kunci: Cold Saw, Jadwal Pemeliharaan, Pemeliharaan Preventive, Saw Blade.

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1.0 INTRODUCTION

In an increasingly competitive industrial era, companies are racing to provide the best quality and service in their products. Therefore, it is important for every company to pay more attention to the quality of the products they create. This effort will have a positive impact on the company, as good quality will bring its own benefits. Poor product quality control can cause consumers to reject the product. If this happens, the company will suffer losses that could harm their reputation. Therefore, the company needs to continuously improve quality to maintain customer trust and satisfaction. In the production system being implemented, the company must support it with adequate maintenance so that the machines used remain well-maintained and do not easily experience damage.

Maintenance is a crucial aspect of business operations, especially in industries that rely on equipment and machinery for production processes. The purpose of maintenance activities is to ensure that all company assets, including machines, equipment, and infrastructure, remain in optimal condition so that operations can run efficiently and effectively. In an increasingly competitive business environment, downtime due to machine breakdowns can have significant impacts. This not only reduces productivity but can also affect product quality, increase production costs, and decrease customer satisfaction. Therefore, having an effective maintenance strategy is crucial to maintaining the reliability and performance of equipment, as well as optimizing operational costs.

PT. KBK was established in 1992, previously known as PT. Wajatama, and is a subsidiary of PT Krakatau Steel. This company operates in the field of steel product manufacturing to meet the needs of construction and infrastructure. The products produced include Deformed Bar, Plain Bar, Equal Angle, Channel U, Wide Flange, H Beam, and I Beam, with high-quality standards. To produce high-quality products, this company needs to pay special attention to the maintenance of each piece of equipment to keep it in optimal condition.

2.0 METHODOLOGY

The following are the methods used by the author for data collection in this research:

1. Literature Study This method is carried out for the collection and compilation of data from existing literature to fulfill the report writing.
2. Observation This method is carried out by conducting direct observations in the field with the aim of allowing the writer to understand the field conditions according to the defined problem.
3. Interview This method is carried out by directly asking the field supervisor or someone who has knowledge and experience related to the field being studied on the observation object.
4. Data Processing Conduct data processing and analysis of the obtained data. Based on the analysis, it is presented in the conclusion.

Maintenance is a function in a manufacturing industry that is as important as other functions such as production. This is because if we have machines/equipment, we usually always strive to continue using the machines/equipment so that production activities can run smoothly [5]. Maintenance is a supporting activity for commercial activities, so like other activities, maintenance must be effective, efficient, and low-cost. With the implementation of maintenance activities, production machines/equipment can be used as planned and do not experience damage during the planned period [4]. The main objectives of conducting maintenance are as follows:

1. Maximizing operational time or production capacity.
2. Optimizing production capabilities.
3. Minimizing the cost per unit.
4. Minimizing the risk of loss of productive capacity.
5. Minimizing the occurrence of accidents among employees.
6. Minimizing damage to the environment.

Here is the classification of maintenance commonly used in the industry:

1. Corrective Maintenance
   Corrective maintenance is an unscheduled maintenance activity, meaning that the maintenance action is unscheduled due to the cause of a product system failure. The corrective maintenance activities are carried out after the component has experienced damage, with the aim of restoring the damaged system to its original condition. In that maintenance, several failure symptoms can be identified and verified, namely failure isolation, inspection of the damaged parts, performing component relocation and maintenance, or on-site replacement. This maintenance system is carried out if the occurrence of damage has been predicted [2].
2. Preventive Maintenance
   Preventive maintenance is a maintenance and care activity carried out to prevent the occurrence of unexpected damages and to identify conditions or situations that could cause production facilities to suffer damage when used in the production process. Preventive maintenance is where maintenance activities are carried out on a scheduled basis. This activity aims to prevent failures, inspect failures, reduce the performance degradation of component reliability, identify the causes of

unpredicted damage, and improve the availability of the system's components [6].

3. Predictive Maintenance
   Predictive maintenance is maintenance actions carried out on a predetermined date based on predictions from the analysis and evaluation of operational data collected for predictive maintenance, which can include vibration, temperature, vibration, flow rate, and others. Predictive maintenance planning can be carried out based on data from field operators submitted through work orders to the maintenance department for appropriate actions to be taken, ensuring that the company is not harmed. For maintenance like this, it is necessary to identify the cause of the disruptive factors. These factors must be eliminated by taking appropriate preventive measures before a system can experience a significant decline [7].

Cold saw is a metal cutting tool that uses a disc-shaped blade to produce high-precision cuts with minimal heat. Cold saw is a metal cutting tool that uses a circular blade made of high-speed steel (HSS) or carbide-tipped steel. This tool is called a cold saw because its cutting process generates little heat, so the workpiece remains relatively cool even when cut [3].

Figure. 2 Cold Saw

Cold saws are widely used in industries that require precision metal cutting, such as heavy equipment manufacturing, metal structure fabrication, the automotive industry, and decorative metalworking. Cold saws are very important in the construction industry due to their ability to produce high-precision cuts on structural materials such as beams and steel profiles. The ability of a cold saw to work on thick materials such as heavy steel beams makes it an ideal tool for large-scale construction needs [3].

3.0 RESULTS AND DISCUSSION

In the process of forming finished goods in the section mill area, there are several areas before they become ready-to-use production items. The equipment includes the furnace, stand 1, stand 2, stand 3, stand 4, transfer bench, stand 5, cooling bed, straightener, cold saw, layer transfer, stacking, and pack storing. In each piece of equipment, there is a roll table that serves as a connector between one piece of equipment and another to transport the initial raw materials into a finished product ready for use. Cold saw is one of the most important components in the process of turning raw materials into finished products at PT. KBK. This is because the cold saw plays a role in changing or cutting the shape of the raw materials that will be processed. Based on the important role of the cold saw, maintenance activities need to be carried out to keep the equipment in optimal condition so that it can function and work optimally to produce high-quality product.

The maintenance processes carried out in the cold saw area are extensive, ranging from preventive maintenance, corrective maintenance, to predictive maintenance. On this occasion, the author will focus solely on the preventive maintenance process carried out in the cold saw area at PT.KBK, which is part of the maintenance division. The maintenance process carried out by the team on the cold saw section is done once a week. The maintenance team that conducts the inspections consists of 4 mechanics divided into 2 groups. The components in the cold saw area that are routinely checked by the team are as follows:

1. Check roll table entry
   In the preventive maintenance process of the roll table, this is done by visually inspecting the bolts on all parts of the roll table to see if the installed bolts are tight and secure, thus avoiding the loosening of bolts that could cause the roll table to not operate optimally during the production process.

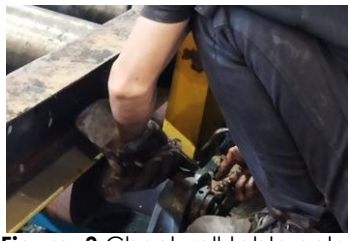

Figure. 3 Check roll table entry

2. Chek bolt coupling motor translation
   In the preventive maintenance process of the bolt coupling, it is done visually by checking whether the bolts installed on the coupling are tightened and secure. If the bolts are not properly installed, it will cause the coupling to vibrate when the machine operates. Damage to the coupling components will also affect the gearbox due to excessive vibrations.

Figure. 4 Chek bolt coupling motor translation

3. Check rell sliding translation

In the process of preventive maintenance of the sliding translation rail, this is done visually by checking if there are any cracks, unevenness, or positional deviations in the rail. If there are deviations in the rail, it will cause the cutting process to be misaligned because the translation for the forward and backward movement of the saw will also experience deviations.

Figure. 5 Check rell sliding translation

4. Check roll table motor hydraulic

In the preventive maintenance process of the hydraulic motor roll table, it is conducted visually by checking if there are any bolts that are not tightly and correctly installed, leaks, or cracks in the pipes and hydraulic hoses to avoid fatal damage to the components during cutting.

Figure. 6 Check roll table motor hydraulic

During the research period, 13 damages were found in the cold saw area, with the most frequent damage occurring on the saw blade (6 cases). The types of damage include dull blades, cracks, and imprecise cutting.

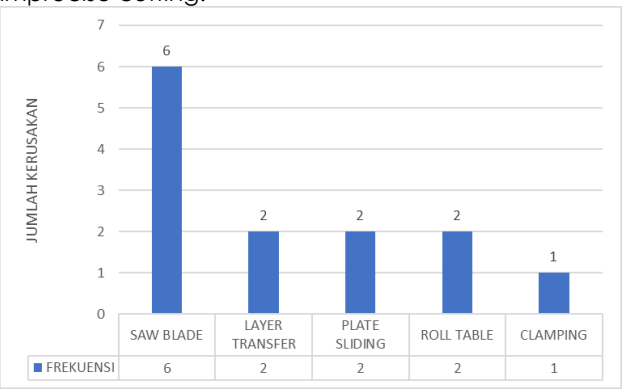

Figure. 7 Graph of Evidence of Damage Findings

Figure. 8 Damage to the saw blade

In the graph, the problem that often occurs is with the saw blade. The factors causing the damage are identified as follows:

1. Man (Human)

The operator's lack of precision in installation and maintenance. This mistake often occurs during routine inspections or component replacements.

2. Material:

The quality of the material that is too hard exceeds the tool's capacity. Materials like high-hardness steel tend to accelerate the wear of the saw blade.

3. Method

Inconsistent work instructions. Some technicians do not fully follow the standard operating procedures (SOP).

4. Machine

The age of the machine increases the risk of vibration and damage. Older components are more prone to structural damage.

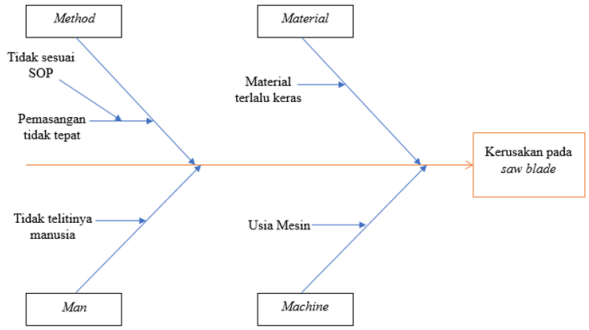

Figure. 8 Fishbone diagram saw blade damage

preventive maintenance activities can prevent major damage and maintain operational stability. However, recurring findings such as dull saw blades indicate the need for improved inspection methods. Additionally, an evaluation of the maintenance schedule needs to be conducted to reduce downtime due to frequent damage. In the case of saw blade damage, solutions such as immediate replacement and evaluation of the quality of the material being cut are implemented. However, refining technician training and selecting tools that match the material characteristics are key to preventing similar damage in the future. Additionally, the maintenance team is also considering the use of sensor-based predictive

technology to monitor the condition of components in real-time.

Based on the collected data, it appears that the maintenance process on the cold saw requires more attention to the adjustment of the lubrication process. The manual inspection process conducted every week shows limited effectiveness because some components experience damage that goes undetected earlier. This underscores the need for a systematic evaluation of the procedures and tools used during preventive maintenance.

4.0 CONCLUSION

The implementation of preventive maintenance in the cold saw area at PT. KBK has proven effective in minimizing machine failures, reducing downtime, and maintaining operational efficiency. The preventive maintenance activities, which included routine inspections of key components such as the roll table, bolt coupling motor translation, sliding rail, and hydraulic motor, ensured that the machinery remained in optimal working condition.

The primary issue identified during the maintenance period was the frequent dullness of the saw blade, which affected the quality and efficiency of the cutting process. Through root cause analysis using a fishbone diagram, several contributing factors were identified, including human error, material hardness, improper maintenance procedures, and machine age. Addressing these factors is critical for preventing recurring failures.

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