

CHAPTER 1 - INTRODUCTION

Indonesia has become one of the world's wealthiest countries due to its abundance of mineral and coal resources. Especially coal, Indonesia is one of the world's top coal producers. However, future coal utilization will be increasingly challenging, especially driven by the international commitment that collectively reinforces the ambition to reduce greenhouse gas emissions significantly.

As a fossil resource, the direct exploitation of coal will continue to struggle with the environmental issues of life that are at stake today and in the future. Meanwhile, Indonesia's coal resources and reserves are still huge. According to the Geological Survey, Indonesia has 143.73 billion tons of coal reserves, including reserves of 38.80 billion tons.

Such vast coal resources and reserves as well as the infrastructure and climate of the coal mining industry that has been awakening well all these years must not be forgotten. Besides, the technology of developing and expanding coal so far has been so advanced with many alternatives. The conventional use of coal by combustion as a source of energy is not environmentally friendly. But this doesn't mean the coal era just stopped.

In recent years, the government has been pushing coal development and utilization policies to increase the added value of domestic coal while keeping in mind the environmentally friendly aspects. That is why the government has drawn up a road map of coal development and utilization as a basis for coal-based industry policy and direction for the next 25 years.

As an energy source, coal is projected to still play an important role for the next 30 years. In the National Energy Policy, coal will still take a 25% share of the national energy mix. The contribution of coal as an energy source must be by considering the environmental aspects that are becoming global concerns.

1.1 Background

Coal seams are extracted using both surface and underground mining techniques. Surface and underground coal mining include a wide range of equipment and methods. The decision on which technique to use for extracting a coal seam depends on technological, economic, and sociological factors. The technical factors encompass the quantity, dimensions, and inclination of the seams, the composition of the overlying strata, the calibre of the coal seams, the configuration of the surface terrain, the physical attributes of the surface, and the connectivity of transportation systems. Energy consumption, growth, alternative energy supply and cost, coal quality and preparation costs, coal selling price, technical developments impacting production costs, and environmental regulation are all economic factors. Social variables encompass factors such as the mining history, ownership patterns, availability of workers, and support from local or regional government.

Benching is employed in open-pit mining of coal seams, when platforms are created in both the overburden and the coal seam. The open-pit method is employed for extracting coal from steeply inclined coal seams that are covered by either large or thin layers of overburden. Substantial storage facilities located outside the mine are required to hold large quantities of overburden materials throughout the mining process.

The coal production process in open-pit coal mines uses heavy equipment such as excavators as loaders, dump trucks as haulers, bulldozers as machine support, and motor graders as road maintenance equipment as described in Figure 1.1 Open-Pit Coal Mining Process.

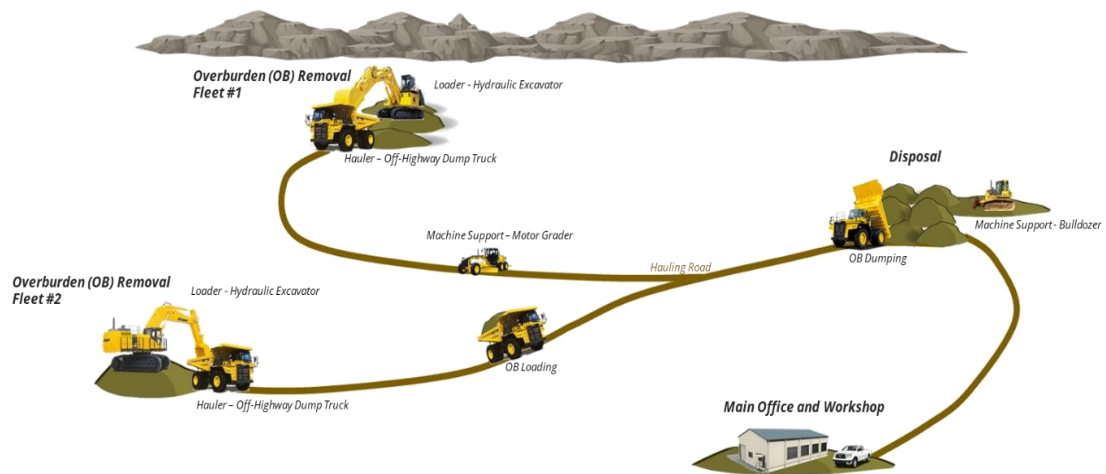


Figure 1.1 Open-Pit Coal Mining Process.

Each heavy equipment is claimed to have good performance to achieve the targeted productivity, one of the machine performance indicators is Physical Availability (PA). One of the factors influencing the achievement of Physical Availability is the total breakdown duration either scheduled breakdown or unscheduled breakdown.

To achieve the annual production targets of both overburden and coal, PT. XYZ uses a lot of heavy equipment from a variety of brands including one of them Komatsu. Which Komatsu machine population used in the company can be seen in Figure 1.2 Komatsu Machine Population at PT. XYZ.

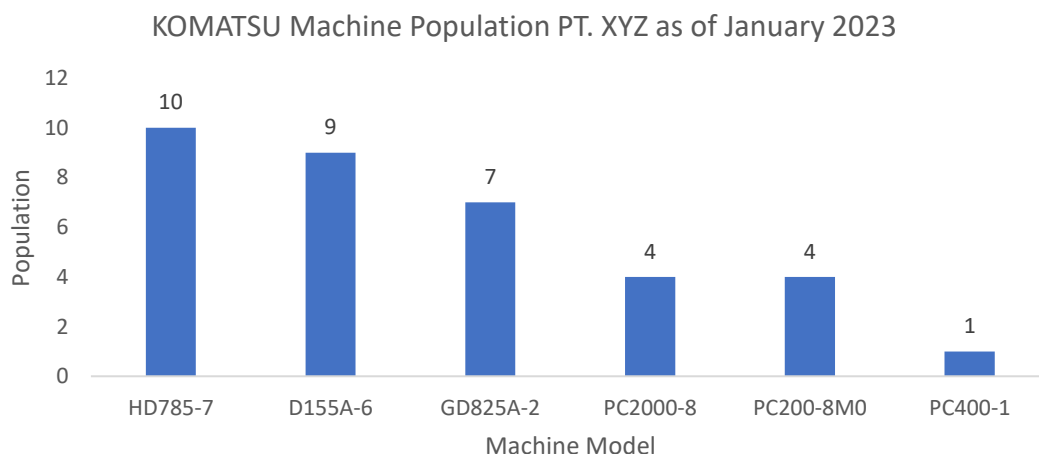


Figure 1.2 Komatsu Machine Population at PT. XYZ.

To support the achievement of coal production, PT. XYZ strives to maintain the performance of its heavy equipment by performing periodic maintenance activities including periodic inspection (PI) and periodic service (PS) in accordance with the Operation and Maintenance Manual (OMM) of Komatsu. In addition to periodical maintenance, PT XYZ has also undertaken Condition-Based Maintenance (CBM) activities to monitor and maintain the performance of heavy equipment with formulated and established several Key Performance Indicators (KPIs) namely:

1. Physical Availability (PA)
2. Mean Time Between Failure (MTBF)
3. Mean Time to Repair (MTTR)

The heavy-duty Komatsu Dump Truck HD785-7 has a machine health monitoring system, or VHMS (Vehicle Health Monitoring System). In mining equipment like Komatsu Dump Truck HD785-7, an extra Komatsu device is called the Vehicle Health Monitoring System (VHMS).

This research will be focused only on the achievement of Physical Availability (PA) of the machine and the factors that affected it. Optimizing machine health monitoring system to reduce downtime.

1.2 Research Problems

As described in Figure 1.3 Physical Availability Komatsu Dump Truck HD785-7, the Physical Availability (PA) of Komatsu Dump Truck HD785-7 was not achieved from the targeted PA of the company so over-burden (OB) production was also not achieved, and the product image became poor.

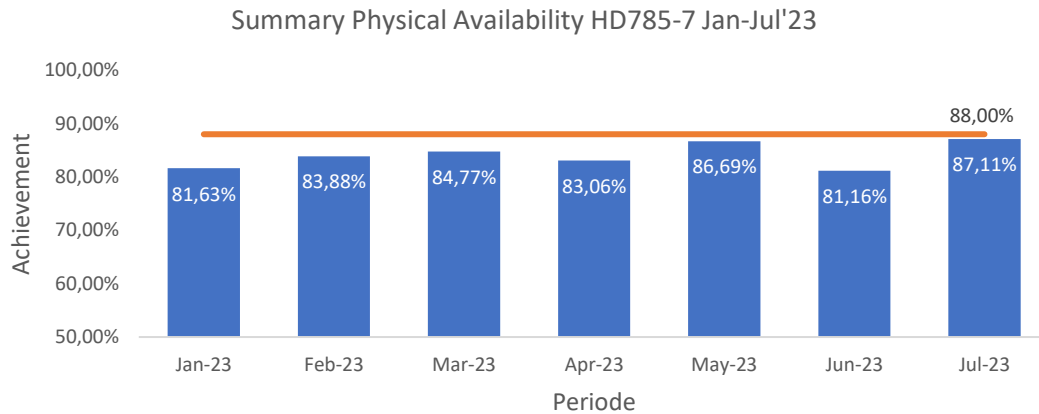


Figure 1.3 Physical Availability Komatsu Dump Truck HD785-7.

1.3 Research Objectives

In relation to the topic discussed, the research objective is to reduce unscheduled downtime for improving the Physical Availability (PA) of Komatsu Dump Truck HD785-7 to the company target.

1.4 Significance of Study

There are 3 significances things of this research that researcher getting done:

1. The study will examine the continues data of the machine that impacts on machine Physical Availability (PA).
2. The study will examine the discrete data of the machine that impacts on machine Physical Availability (PA).
3. Optimizing existing machine health system to reduce unscheduled downtime.

Those 3 things are carried out to get the precise value to prevent the unscheduled breakdown of the machine so that it will reduce the whole downtime duration and improve the Physical Availability (PA).

1.5 Research Questions

Question #1: How does reducing unscheduled downtime impact on PA optimization?

Question #2: How could machine health impact on The Physical Availability (PA) of Komatsu Dump Truck HD785-7?

1.6 Hypothesis

Hypothesis #1: The reduction of unscheduled downtime will improve machine Physical Availability (PA).

Hypothesis #2: The use of machine health monitoring systems as pre-warning information will reduce unscheduled downtime.