



# D85-1 Transmission Maintenance and Repair (Case study: Maintenance and Repair of D85-1 Transmission Clutch Slip)

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**Abstract.** Heavy equipment has several types depending on its function, and one of them is the dozer unit. Dozers are considered the most efficient heavy equipment units for mining activities, mainly digging, pushing, and pulling material. The transmission is a component of the Bulldozer's drive system that regulates engine rotation speed, torque, and direction. The transmission acts as the primary regulator in determining the speed of the Bulldozer for maximum performance. The formulation of this research is how the D85-1 transmission works, what to do with the D85-1 transmission if a clutch slip occurs, and how to maintain the D85-1 transmission. This research aims to discover how the D85-1 transmission works and understand how to maintain and damage clutch slips. This type of research is qualitative, where data is collected directly from the field. The results obtained are that all component conditions comply with existing standards. Then, after continuing to check the piston, it turned out that the piston seal was leaking. The cause of the piston seal leaking is that the oil is rarely changed, so the oil becomes dirty and then experiences decreased durability, as well as the unit working hours being outside the standard.

**Keywords:** Maintenance, Repair, Transmission, D85-1, Piston.

## 1 Introduction

Coal mining business activities, which are mining businesses are widely managed in Indonesia, especially in the North Kalimantan area. Apart from coal mining, there are other mines, such as geothermal, oil and gas, water, and land, which are essential in providing real added value to national economic growth and sustainable regional development [1]. In the smooth running of the mining process, heavy equipment also plays a vital role as a driving tool for coal processing. Heavy equipment also supports a bulldozer with a well-known brand in Indonesia, "Komatsu," which is imported by PT. United Tractors Tbk. The bulldozer functions as a medium for displacing and pushing soil or materials. Apart from that, it also plays a role in leveling the road surface with rocky or muddy terrain, so a flat road surface is very beneficial in the loading process [2].

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The transmission is a component of the bulldozer's drive system that regulates the speed, torque, and direction of engine rotation. The transmission is the primary regulator in determining the speed of the bulldozer. For maximum performance, care is needed in handling the transmission to minimize the occurrence of damage so that mining heavy equipment management is not harmed [3,4]. Based on these considerations, research was carried out on the maintenance and repair of the D85-1 transmission (Case study on maintenance and repair of clutch slip on the D85-1 transmission).

## **2 Research Methods**

### **2.1. Method of collecting data.**

Data collection through literacy sources such as the internet, books, and shop manuals is needed to obtain additional data. Another method is interviewing by getting information directly from customers who have damaged units and direct information from operators and mechanics who handle the unit. The last is the observation method, which involves direct observation of the research material's equipment. With this method, a lot of accurate data will be obtained because they are directly involved in the repair process carried out by the mechanic who handles the unit.

### **2.2. Supporting Tools.**

Data collection must be perfect to ensure quality and safety, including shop manuals and personal protective equipment (PPE). The shop manual functions as a guide in disassembly so that it only disassembles tools that are related to the damage so that time is not wasted disassembling tools that have nothing to do with the damage. PPE includes (1) Safety helmet, namely to protect the head from impacts with sharp or blunt objects; (2) Safety gloves function to protect hands from work objects that could injure our hands; (3) Safety shoes are used to protect the feet from the danger of falling heavy objects, stepping on sharp objects, being splashed by corrosive acid and base solutions or hot liquids. Protective shoes must have toes made of steel and can withstand water leaks when in watery places. However, if working in a place that contains electric current, it is a must wear shoes without metal; (4) Toolbox is a place where keys are kept that are useful for disassembling; (5) The camera functions to document everything that happens during demolition, and the results of this documentation are also helpful as a report when the damage has been repaired; (6) The marker functions to mark everything that has been dismantled so that when assembling it will be easy to find its place.

## **3 Results And Discussion**

This research was carried out in several parts, including (1) Disassembling, (2) Inspection and measurement, and (3) Component analysis

### **3.1. Disassembling**

Removing the bulldozer frame transmission is the first step taken. After the transmission is removed from the bulldozer frame, dismantle all the components on the outer cover of the transmission. Then, remove the outer cover of the transmission according to the shop manual's instructions until the internal components of the transmission are visible. After that, dismantle all the internal components of the transmission, and finally clean all the internal components so that it is easy to inspect and measure (Figure 1).






	Transimisi <i>bulldozer</i> D85-1
	<i>Transmission control valve</i>
	<i>Shop manual</i>
	Transmission internal parts
	Cleaning the inside of the transmission

Fig. 1. Disassembly process

**3.2. Inspection and Measurement**

After the disassembling steps have been completed, several components are then inspected and measured, including

1. inspecting and measuring the main relief valve,
2. carry out inspections and measurements on the transmission control valve,
3. carry out inspections and measurements on the disc.

**3.3. Component Analysis**

The components will be analyzed after inspection and measurement. Inspection of the main relieve valve is carried out at the working temperature of the unit, which has been

reached, then install the coupler on the main relief valve nipple port. Ensure all PPCs are in neutral and remember to read the pressure gauge at high idle and low idle. After checking the main relief valve, no damage was found. This indicates that the components still meet standards.

Checking the transmission control valve begins with checking the pressure and leaks in the transmission control valve. Open the cover on the right side of the cabin, open plug bolt 19, then use a pressure gauge to check the pressure (low and high idle). When checking the transmission control valve by checking the pressure, there is no damage to the valve, so it can be sure that the component is still up to standard—disc examination using a vernier caliper to measure disc thickness. The results showed that the disc size still met the standard. Inspection of the input shaft is carried out by measuring the diameter of the input shaft using a micrometer. The results showed that the input shaft still met standards. Inspection of the pinion shaft is carried out by measuring the diameter of the pinion shaft using a micrometer. The results showed that the pinion shaft size still met standards. The forward sun gear inspection results found that the component sizes still met standards, likewise, with checking the reverse sun gear.

Check the spring using a load tester, then press the load tester, and the results show that the component size still meets the standard. Checking the pressure on the lubrication relief valve is done by removing the bolt on the lubrication relief valve and installing a pressure gauge. The results showed that the components were still in standard condition.

Checking the piston was carried out by disassembling the transmission; when checking, it was found that the piston seal leaked. After checking the transmission with a clutch slip, it is found that the piston seal is leaking, so the first thing that must be done is reseal the piston seal that is leaking. After resealing, the following things to do include: (1) bleeding the clutch oil; (2) check the clutch oil; (3) check the condition of the clutch lining; (4) ensure that the clutch pedal setting is according to standard (Figure 2).

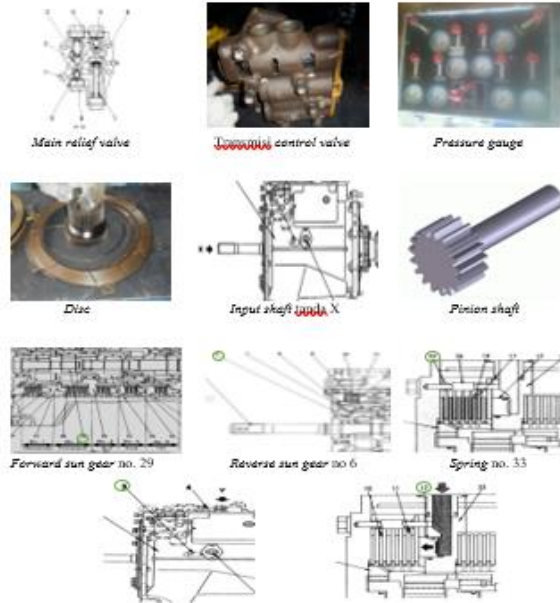


Fig. 2. Check each component

## 4 Conclusion

Results of dismantling carried out on the D85-1 transmission carried out at CV. MUHIBAH then there are checking results consisting of main relief valve components, transmission control valve, disc, input shaft, pinion shaft, forward sun gear, reverse sun gear, spring, lubrication relief valve so the results obtained are that all component conditions are in accordance with the specified standards There is. Then, after continuing to check the piston, it turned out that the piston seal was leaking. The cause of the piston seal leaking is because the oil is rarely changed so the oil becomes dirty and then experiences decreased durability, as well as the unit working hours being outside the standard. Therefore, after the checking stage is complete and problems are found with the transmission, then an overhaul is carried out by resealing and after this is done, maintenance is carried out so that this tends not to happen again in the future. The maintenance method is by bleeding the clutch oil, checking the clutch oil, checking the condition of the clutch lining and ensuring the suitability of the clutch pedal settings.

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