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Analysis and Research on the Combined Point Height of Commercial Vehicle Clutch Pedal

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Abstract: This paper mainly introduces the factors affecting the high coupling point of commercial vehicle clutch, and analyzes the factors mentioned. Clutch in the car powertrain is a key ring, one of the main functions of the clutch is to cut off and realize the engine power transmission, the use of the clutch can ensure when the car starts to make the transmission system and the engine more smooth, more convenient docking, to ensure the relative smooth start of the car. This paper mainly introduces the influencing factors of the high binding point of the clutch pedal in commercial vehicles, and explains the various factors, and at the same time explains how to solve the problem of the high binding point of the clutch pedal in combination with the vehicle model, so as to improve the driver's driving comfort.

Keywords: Commercial vehicle clutch; Joint point; Influencing factors

1. Introduction

The In the case of very large working dynamic load, the clutch can still effectively limit the transmission system to bear the torque, so that the transmission system can prevent damage due to excessive load, thus effectively extending its service life; At the same time, the design can effectively reduce the noise level.

2. The Process of Clutch Separation and Coupling

The clutch binding point is the critical point at which the torque energy can be transmitted by the clutch that enables the vehicle to start when a vehicle is stationary. In general, the clutch will be installed with the engine crankshaft flywheel assembly, generally speaking, the clutch combination process is actually the clutch from the separation state to the combination state transformation process, and the combination point in this process is actually an intermediate state.

3. Clutch Composition and Classification

The clutch is mainly composed of three parts, the driven plate is divided into total, separate bearing assembly and pressure plate assembly. Clutch separation system is an important part of the clutch, starting from the clutch pedal, finally separated from the bearing, generally pedal, tubing and other components [1].

Clutch classification is mainly in accordance with the number of driven plates or separated bearing type two categories for classification. If according to the number of driven plate classification, can be divided into double plate clutch and single plate clutch; According to the type of separation bearing classification, can be divided into push type and pull type two types of clutch.

4. High Clutch Joint Point Factor

4.1. Influence of axial compression amount of driven disk

Assuming other conditions remain unchanged, only the change from the rotor axis to the compression amount is considered. The axial compression force F of the driven disk is proportional to the corresponding axial compression amount F, and the size of the axial compression force F of the driven disk increases with the increase of the corresponding axial compression amount F. The compression of the driven disk of the low-stiffness clutch is Mx, and the compression of the driven disk of the high-stiffness clutch is Md.

According to the above analysis, we can draw a conclusion, that is, if you want to effectively reduce the clutch binding point pedal height, as long as the choice of driven disk axial compression of large amount of low stiffness clutch. Of course, there are advantages and disadvantages, to ensure the height of the same time can not do the axial compression of the larger the better, or to ensure that in the normal state, the disc lift can be completely separated.

4.2. The effect of the amount of pressure on the cover assembly

The results show that the pressure of the cover assembly is linearly related to the travel of the pressure plate, and

the pressure of the cover assembly decreases with the increase of the travel of the pressure plate. If we only consider the cover assembly clamping force of the single factor changes, from the state of clutch pressure plate just contact platen to clutch the middle of the combining site state and large clamping force cover assembly pressure plate return for Xd, small compression force cover assembly of platen backhaul to Xx, is obviously we can conclude that Xd is less than Xx, and accordingly can launch point of the clutch pedal height of Md '< Mx' [2].

From the above analysis results we can draw a conclusion that to a greater extent to reduce the height of the clutch pedal, select the clutch can be a large compression force.

There is also a point to be taken into account, that is, loss in use. After use for a period of time, the compression force of the cover assembly will be attenuated, and it is not wise to only increase the compression force to alleviate the attenuation caused by diaphragm spring fatigue. The greater the compression force, the greater the clutch backup coefficient will also be larger, the greater the separation force, then we must consider whether the clutch operating system and the vehicle model match.

4.3. The problem of attenuation of rebound amount of wave piece

After using the clutch for a period of time, the free thickness of the clutch will become smaller and the amount of axial compression from the driven plate will become smaller. It can be obtained from data analysis that the relationship between compression force and axial compression amount of waveform sheet changes from a linear relationship with a small slope to a linear relationship with a large slope when the compression amount changes. When the pressure plate lift does not change, the free thickness of the driven plate L will become smaller, after the clutch is completely separated, the distance between the pressure plate and the driven plate will become larger. Then assume that the attenuation of the waveform plate is Ns. Before the rebound attenuation, after the clutch is completely separated, the distance between the pressure plate and the driven plate is Z, and the return trip of the pressure plate is Z+Yx. After rebound attenuation, the return trip of pressure plate is Z+Ns+Yd. In terms of the pedal height at the combination point of clutch, the pedal height after rebound attenuation is significantly higher than that before rebound attenuation.

It can be seen that the clutch joint point is the cause of the pedal higher, is the attenuation of the rebound of the waveform. Under normal circumstances, requirements for compression characteristics of corrugated plates should be detailed in the clutch drawing for this part of the driven disk assembly.

4.4. Friction coefficient

In the rough road, road conditions are very poor, the use of the clutch number will be greater, when the vehicle kept on, stop, the pressure plate internal temperature will increase, and high temperature will lead to friction material friction coefficient of small range reduction. Although the friction coefficient reduction range is limited, but this will still have a significant impact on the clutch pedal joint height.

If the friction coefficient is reduced, but the starting torque is not changed, then the clutch must need more pressure. In the same line and cover the same force, the greater the pressure, then, the clutch joint pedal return trip, and the greater the pressure plate return trip. At this point of the clutch, it will show the joint point of the pedal higher image.

When the car starts with high grade, the engine starts at a relatively low speed, and then the speed will increase a lot, correspondingly, more friction work will be produced, and the analysis shows that the reduction of friction coefficient will also lead to the clutch joint pedal higher.

4.5. Influence of starting slope and load

Each time the load of the car is different, and the difference is very big, will also lead to a relative difference in starting torque. If the car in the process of moving, the load load suddenly increased, the starting torque requirements will be relatively large, and the clutch cover assembly to provide more pressure.

Then we can get the conclusion that, when the cover assembly remains unchanged, the pressure plate backstroke and compression force will increase, the corresponding clutch point pedal backstroke will also increase, then, the clutch point at this time will show the phenomenon of pedal higher.

5. Analysis of Experimental Data

The five points mentioned above affect the high clutch joint point factors, a car park on the five factors of real car experiments, to verify the analysis of these factors is accurate. The experimental results show that :(1) in the case of the cover assembly pressure remains unchanged, to maintain the clutch joint point pedal height is lower, then need to drive the disc axial compression amount increased; (2) on the contrary, when the axial compression of the driven disk remains unchanged, the lower the pedal height at the clutch binding point becomes, the greater the compression force of the cover assembly is required.

6. Conclusion

Through the comprehensive theoretical analysis of the high binding point of the pedal in commercial vehicles, the causes of the high binding point of the clutch pedal are exposed. On this basis, improvements can certainly solve the driver's complaints.

References

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