

Gear Shift Force Reduction in Manual Transmission

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Abstract: In automobiles, power from the engine is transmitted to the wheels through the Transmission system. The objective of this work is to reduce the Gear Shift Force in Manual Transmission. By reducing the shift force, the gear change can be done easily without a large effort. This also helps in emergency situation to shift gear easily and quickly. Initially the gear shift force for each gear is measured on various models of Transmission. The results are analyzed and the benchmarking of the best component is done. Finally by changing the specification of the components the shift force on the gears has been reduced.

1. INTRODUCTION:

In the upgrading automobile market many comfort and safety factors given to the customers. Comfort make the customer to drive the car with easy and gives good feelings. The shift feeling and comfort while driving is influencing factor, which decide overall impression of vehicle. Designer has to fulfill basic requirement of gearshift, which can be roughly summarized by the following attributes: smooth, exact as well as noiseless and without vibrations.

For gearshift performance improvement most of the researchers have worked only on single parameter where as it should be studied considering the impact of all parameters together. Present work has been undertaken to study the influence of various parameters for combined effect.

2. TRANSMISSION:

The most powerful engine in the world is of little use unless the power from the engine is safely and effectively transmitted to the wheels. This can be achieved by the transmission system. In addition to being able to transmit the torque and power from the engine, the transmission system also must allow the vehicle to operate over a wide range of speeds from the engine, the transmission system also must allow the vehicle to operate over a wide range of speeds from a standstill to the maximum speed of the vehicle. Furthermore, the transmission also must be designed to satisfy the conflicting requirements of requirements of quick acceleration, high speed and adequate fuel economy.

2.1 FUNCTIONS OF TRANSMISSION

The main functions which are performed by the transmission are:

At low speeds, the torque produced by an I.C engine is very small, which increases of speed, peaks at some optimum speed and

starts decreasing beyond that. This would mean that:

If the engine is directly connected to road wheels, it may not have enough tractive effort to start the vehicle from rest.

The practical considerations for the running of an automobile under different conditions demands a large variation of torque at the road wheels, which would mean that it would not be possible to always run the engine at the optimum speed. Besides, the bigger engine would be required to cater to the torque required under most difficult conditions.

Thus, the main purpose of transmission is to provide a means to vary the leverage or torque ratio between the engine and the road wheels as required.

The transmission also provides a neutral position so that the engine and the road wheels are disconnected even the clutch in the engaged position.

A means to back the car by reversing the direction of rotation of the drive is also provided by the transmission.

2.2 NECESSITY OF TRANSMISSION

- a) Variation of resistance to the vehicle motion at various speeds.
- b) Variation of tractive effort of the vehicle available at various speeds.

3. SLEEVE:

A sleeve is the component which engages with synchro teeth of the drive gear.



Fig.no.1

4. HUB

The synchronizer hub is fixed on the output shaft via splines of your transmission & the shift sleeve is fixed

onto your hub via splines. Whereas the constant mesh gear rides on a needle bearing on the output shaft. When you shift into a gear, the shift fork slides the shift sleeve into the clutch body ring & the power is transmitted to the output shaft.



Fig.no.2

5. KEYSYNCHONIZER:

The key synchronizer is mainly used for smooth gear changes, the synchronizer mechanism synchronizes the rotation of the engaging area and engages gears.



Fig.no.3

6. TRAIL STUDY

6.1 CLEARANCE INCREASE

The clearance between the hub and sleeve is increased. So that the sleeve move over the hub freely while engaging the gear. This reduce the fore to some extend.

6.2 TENSION REDUCE

The key synchronizer has tension to hold the sleeve above the hub. The tension is reduced to a maximum possible value and so the sleeve moves freely over the

hub without any slip in bumpy roads. This reduce the shifting force.

7. CONCLUSION

Before the trail study many other possibilities are checked over and concluded that above two trail has greater impact in the transmission gear system.

Study 1 has a result up to 30% reduction in gear force. Study 2 concludes up to 25% result on force reduction.

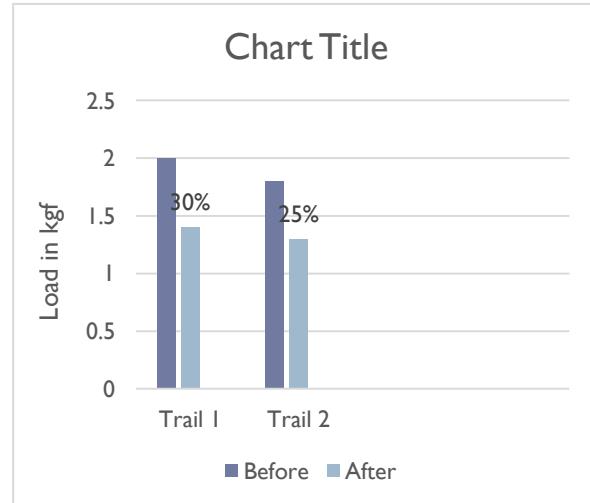


Fig.no.4

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