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# Study on hard shifting of gears in transmission box assembly and analysis of noise concern from transmission box of a four wheeler vehicle at variable loads and speeds

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***Abstract -*** *This paper deals with the study of transmission gear box assembly focusing on the hard noise or gear shifting noise from transmission side. During application of the transmission it was noted that there is some hard noise from inside the transmission. It has more chances of failure of synchronizing ring irrespective to the other parts. In case of any noise concern from vehicle during operation with effect to the transmission in or from the transmission gear box assembly ;there are more chances to failure of the synchronizer ring of the transmission box assembly as per study, which is the cause of failure of the other parts of the engine transmission box. Nevertheless it would not be wrong to say that in case of noise concerns from transmission box, check the gears and in case humming noise check counter shaft bearing but in case of kat-kat noise open transmission box and check synchronizer ring fitted with gears ,replace it to resolve the concerns. It is merely applicable in vehicles used over rough roads; it varies as of the road conditions and driving nature. Material strength gets reduced if proper driving is not followed and as a result failure in the form of inappropriate noise rises from transmission assembly.*

***Key Words***: **Gear transmission box and diverse conditions of driving, abnormal noise from transmission box.**

## 1. INTRODUCTION

The gears are the machine elements, made up to withstand loads, and support another moving machine element, known as journal. It allows a relative motion between the contact surfaces of the members, while carrying the load. The efficiency of any mechanical system depends to a great extent on the efficiency on its gear strength. A necessity for the efficient working of the gears is that the running surface may be properly lubricated. As in case of gear failure the credit goes on rash driving and improper timing for gear changing at variable speeds. In such cases the credit for all such concerns goes to failure of any part most probably from transmission assembly. The study in this paper purely based on practical and real concerns from the people about abnormal noise sometimes from engine side and most probably from transmission assembly. When the shaft is rotated under free conditions, deflections will be created due to the critical speed of the shaft due to this bearings want to change their position, but couldn't due to its fixed position and in case of loads with variable speed and application of water; may be somehow, reduces the life of the transmission parts. On the other hand the life of the rotating elements in a machine system depends on its proper handling knowledge as well as its maintenance as required time to time for proper functioning of the machine elements without failure.

### 1.1 Purpose

Purpose of this study is to provide adequate and possible reasons why because of these there causes various problem during driving like abnormal noise from transmission gear box assembly. As per analysis of the various concerns, in most of the cases there exists the influence of improper driving and gear shifting at an inappropriate time during acceleration and over speed in restricted zone with harsh driving. These are the causes of abnormal noise from transmission side and in this operation most of the time synchronizing ring got worn out when hard noise comes out from the transmission assembly. Most widely in all machines working under high-speed and variable speeds the proper timing of gear shifting is desired at the top from most of the other reasons .The unpredictability of vibration caused at rough roads and the changes of the relative speed may result in producing of abnormal noises. Till date there are various paper published in many journals but my study indicate the specific reason of noise concern in the case of four vehicle driving. The purpose of the present study is to countermeasure the investigation of the various effects of the variable speeds (rpm), with the variable loads, and harsh driving conditions as a result abnormal noise concerns from transmission box.

### 1.2 Variable Operating Conditions

In this analysis kat-kat noise from engine transmission box found and there was hard shifting of gears found. While changing or shifting of gears there was stucking found in this operation. In some applications, the operating conditions, like load, speeds, temperatures and cooling conditions are

continually changing. In such type of applications, gear strength cannot be calculated without reducing the spectrum or duty cycle of the application to a limited number of simplified load cases.

In case of continuously changing loads, each different load level can be accumulated and the load spectrum reduced to a histogram of constant load blocks. Each block should characterize a given percentage or time-fraction during operation. Note that heavy and normal loads consume bearing life at a faster rate than light loads. Therefore, it is important to have shock and peak loads well represented in the load diagram, even if the occurrence of these loads is relatively rare and limited to a few revolutions. Within each duty interval, the bearing load and operating conditions can be averaged to some constant value. The number of operating hours or revolutions expected from each duty interval showing the life fraction required by that particular load condition should also be included

## 2. ROOT CAUSE AND COUNTERMEASURES

Brass material accumulation over the magnetic brushes of the transmission box and noise concern from the transmission box has a relation with each other for proper functioning of the drive. At a period of vehicle running condition, sometimes there exist noise related concerns, at the first sight of inspection, it was assumed that this noise concern could be related with clutch but as the investigation takes place, it was observed to dismantal of gear box on by one as there was accumulation of brass and steel over magnetic particle collector switch. Due to change in viscosity of lubricating oil, increase in backlash, lubricating oil gallery choked with foreign particles causing loss of lubrication which generally occurs due to service of vehicles at unauthorized service stations .Finally to resolve this concern it was observed to change of synchronizer rings of the gears which also affect the counter shaft.

**Fig -1**: Transmission gear box with gear train

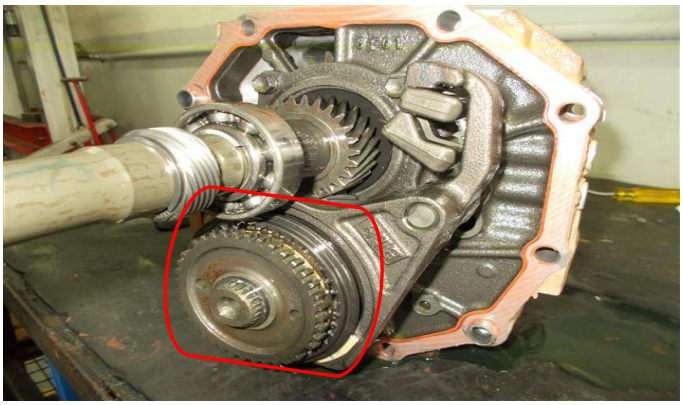

**Fig -2**: Melted view of synchronizer ring

**Fig -3:** Measurement of clearance

## 3. CONCLUSIONS

In the above study and analysis it was noticed that there was hard shifting of gears along with hard noise like kat-kat noise from inside the transmission box assembly. The synchronizer ring found worn out and thus it was replaced with new one to resolve the concern. As a result gear box should not come in direct contact with water to enhance the life of transmission box in its dismantal condition or gear box oil leakage condition to improve the service life of vehicle.

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