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A Literature Survey on Noise Reduction in Winger Bs-4 Gearbox

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Abstract: ***Noise is an unwanted sound. The noise can be generated in various parts of vehicle. Gearbox is one of the parts of vehicle where maximum amount of noise can be generated. The entire gearbox has very complex structure so to find the actual origin of sound becomes very challenging. Many researcher works on the problem to minimize noise level which is generated in gearbox. 4M are widely used in industry to improve the quality of product for root cause analysis to find out actual problem in the gearbox behind the generation of noise. 4M has components of material, machine, method and man. This paper deals with review of literature on noise reduction, using the 4M method to find the actual cause of noise generation in winer gearbox.***
Keywords: Noise Reduction, Gearbox, Transaxle, 4M

I. INTRODUCTION

Winger is front wheel drive car. The main aim of gearbox is to transmit power from engine to the wheels of vehicle. In winger, transaxle with synchromesh gearbox is used. The transaxle is defined as "In the automotive field, a transaxle is a major mechanical component that combines the functionality of the transmission, the differential, and associated components of the driven axle into one integrated assembly." There is absence of propeller shaft in between the gearbox and differential. Mainly transaxle is used in light motor vehicles as compared to heavy motor vehicle to carry out load. Synchromesh gearbox is one of the gearboxes which are used to transmit power from input shaft to output shaft. The working of synchromesh gearbox is similar to Constant mesh gearbox but the only difference is, dog clutch is replaced by synchromesh devices. One big problem occur in constant mesh gear box is that when the driver engage the dog clutch, the main shaft and gear to be meshed running at different speed. So when engage this gear cause wear and tear of dog clutch. This problem is solved by a synchromesh gear box hence it is used with transaxle.



Fig. 1: Winger Gearbox

II. LITERATURE REVIEW

S.H. Gawande, S.N. Shaikh, R.N. Yerraw K.A. Mahajan have studied the transmission system by using the planetary gear set. To reduce the noise level and vibration they built one setup and trails were taken by using two methods i.e. with phasing and without phasing. At last they conclude that noise and vibrations were reduced by using the concept of phasing in the article "Noise Level Reduction in Planetary Gear Set" published in the Journal of Mechanical Design and Vibration in the year 2014.

2. Mats Akerblom did the survey of literature on the gear noise and vibration. He classified his research into three parts, i.e. transmission errors, dynamic models and noise and vibration measurement. He given the brief idea on above three topics and did the literaure survey in the article "Gear Noise and Vibrations - A Literature Survey" published in research gate in the year 2015.

3. Jianxing Zhou, Wenlei Sun and Qing Tao have studied the procedure to calculate dynamic response and generated noise radiation in gear reducer. They built the dynamic model with some consideration and calculate required parameters by numerical method and

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finally calculate gearbox panel acoustic contribution at the resonance frequency range. They researched stiffness improving plans of two gearboxes in the article "Gearbox low- noise design method based on panel acoustic contribution" published in Hindawi Publishing Corporation in the year 2014.

4. Milosav Ognjanović and Snežana ĆirićKostić have studied the effect of gear unit housing on noise generation caused by gear teeth impact. Gear unit housing plays very important role in radiation of sound to the surrounding. By using theoretical, numerical and experimental analysis they explain the role of gear unit housing in the article "Gear Unit Housing Effect on the Noise Generation Caused by Gear Teeth Impacts" published in journal of mechanical engineering in the year 2012.

5. E. Balaji, D. Mouli, P. Rajasekaran, and S. Sudhakar have studied the types of noises and why noises are occurring. They have studied the tip relief method and crowing process to reduce noise in the ZF gearbox. They calculate all the forces which are acting on the gearbox and finally they implemented the above processes to increase the life of gearbox and reduce the tooth failure in the article "Reduction of Noise in ZF Gearbox" published in International journal of mechanical engineering and technology in the year 2017.

6.Rushil H. Sevak and Saurin Sheth have studied the parameters like temperature and noise which affect the gearbox performance. They applied the design of experiment technique (DOE) to control the temperature and noise level in the gearbox in the article "Study and Investigate Effect of Input Parameters on Temperature and Noise in Gearbox Using DOE" published in International Journa of Engineering Development and Research in the year 2014.

III. METHODOLOGY

To find out actual problem in the gearbox we are using the root cause analysis. It is called as 4M diagram. (I.e. fish bone diagram)

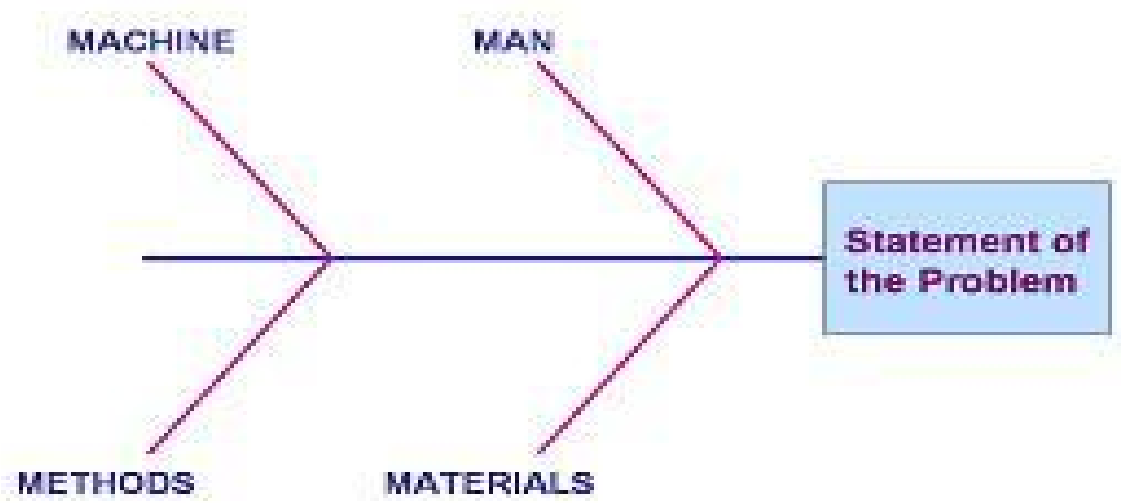


Fig 2: 4M Diagram

A. Materials

Products are manufacturing by doing work on raw materials. The quality of the final product measured in terms of its service life, resistance to apply loads is decided by the properties of raw materials used to manufacture the product.

B. Machine

To produce the parts as fast as possible so that the machine should be in good condition. The daily maintenance is required to keep the machine in good condition.

C. Method

The appropriate method should be used for higher rate of production. The planning must be done before confirming it. The sequence of operation must be correct while production.

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D. MAN

The man should know all the information about the machine and have overall knowledge. The attitude must be good towards the work. Man should give his 100% contribution in the work.

IV. CONCLUSION

We refer all the above papers and we have found main reason behind the generation of noise in the winger gearbox. In the early year's natural aspirator were used in vehicle but due to Bharat stage emission standard-4 turbochargers are used in vehicles. Now by using the 4M (Man, Machine, Method& Material) method, wecan find the actual cause of noise in the winger gearbox.

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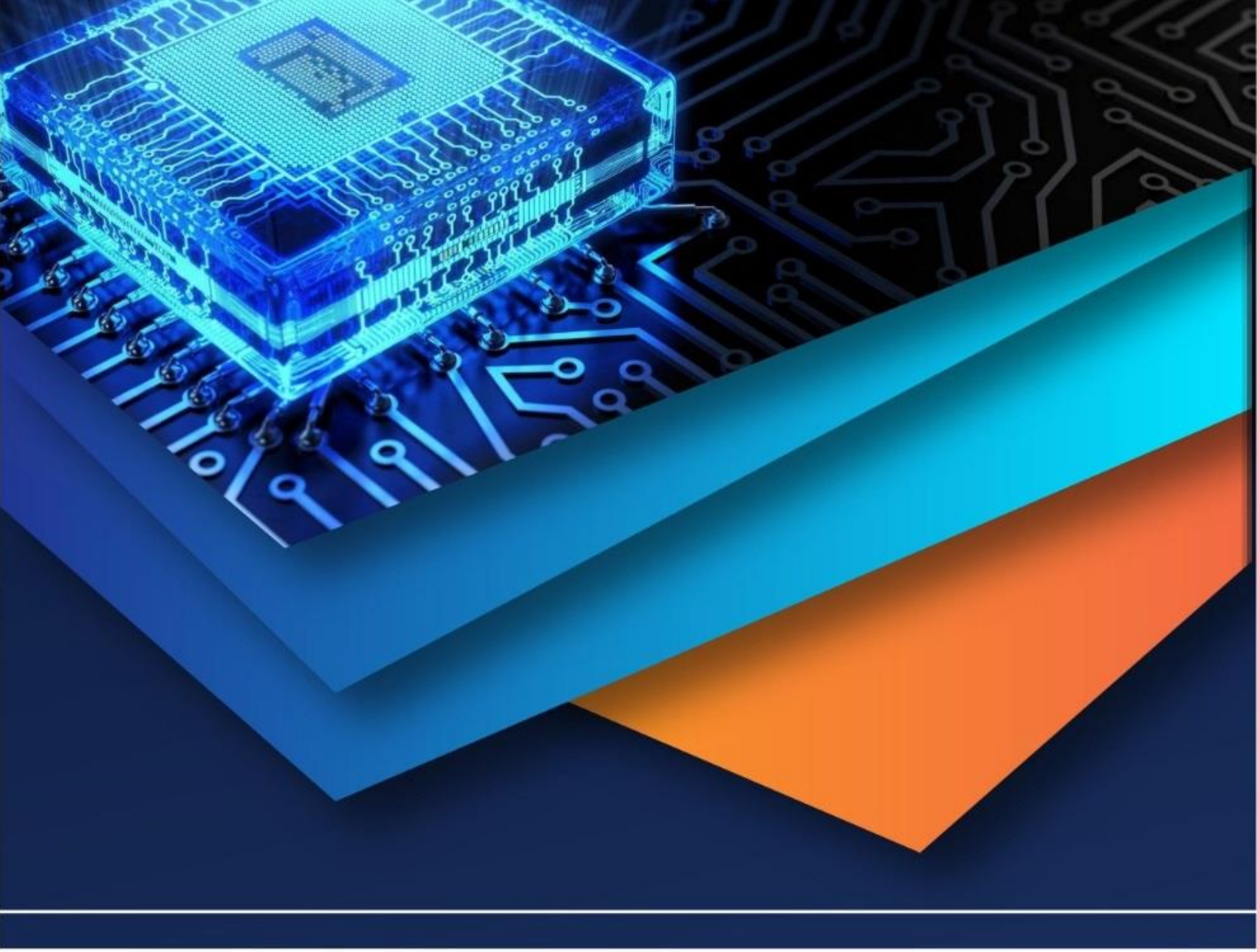
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