

Review Paper on Designing a Muffler

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Abstract- Engine noise is one of the headaches for a bike rider. An engine noise is mainly due to exhaust. Attenuation of an engine exhaust noise has been a subject of interest for many years. Mufflers are used to minimize sound transmission caused by exhaust gas. The objective of this study is to optimize noise level of engine and reduce back pressure as possible. This can be achieved by developing the new muffler design. In designing there are different parameters which have to be taken in to consideration. These parameters can affect muffler efficiency. In this project muffler for four stroke petrol engine was designed to achieve minimum back pressure and reduce noise level.

Key Words: Muffler Design, Four stroke petrol engine

I. INTRODUCTION

Since invention of internal combustion engine in the latter part of the 19th century. The noise is created by many different reason, one of them is exhaust and it trouble to the environmental. Significantly, the exhaust noise in terms of pressure is about 10 times of all other noise combine.

Design of muffler has been a topic of great interest for many years and hence a great deal of understanding has been gain. Hence good design of muffler should give the best noise reduction and offer optimum back pressure for engine.

II. BASIC REQUIREMENT OF MUFFLER DESIGN

- Quiet
- Simple maintenance
- Performance
- Compact design
- Light weight
- Less cost

III. DESIGN OF MUFFLER

The conventional muffler is an enclosed metal tube packed with sound deadening material. An exhaust muffler is an acoustic filter except that waves are converted downstream by the moving medium. Inside a muffler, it contains a deceptively simple set of tubes with some holes in them. These tubes and chambers are actually designed to reflect the sound waves produced by the engine in such a way that partially cancels them out. Most conventional mufflers are rounded or oval-shaped with an inlet and outlet pipe. Some mufflers contain partitions to help reduce noise. Muffler design is traditionally a trial and error process.

IV. DESIGN PARAMETERS

- Number of chambers
- Number of inlets and outlet pipes
- Diameter of Inlet and outlet pipe
- Holes on the pipe

- Size of muffler

V. DIFFERENT TYPES OF MUFFLER

A. Reactive Muffler:

A reactive muffler is shown in fig.1, generally consists of series of resonating and expansion chamber that are design to reduce sound pressure level at certain frequency. Reactive mufflers are used widely in car exhaust system.



Fig.1: Reactive muffler

B. Absorptive muffler:

An absorptive or dissipative muffler as shown in fig.2 uses absorption to reduce sound energy. Sound waves are reduced as their energy is converted into heat in the absorptive material. A typical absorptive muffler consist of a straight, circular and perforated pipe that is encase larger steel housing.



Fig.2: Absorptive muffler

VI. CONCLUSION

A vehicle muffler should be design to reduce back pressure and better noise attenuation.

VII. REVIEW

- [1] In 2005, M. Rahman, T. Sharmin, A F M E. Hassan, M. Al Nur, The muffler is capable of attenuating noise by about 25 to 35 Db. The muffler is designed to attenuate both high and low frequency noises. The reactive portion of the muffler has been covered with a layer of absorptive material which considerably decreases the self-generated noise of the muffler. The material used in the muffler is capable to withstand temperature of higher order
- [2] In 2014, Mr. Jigar H. Chaudhri, Prof. Bharat S. Patel, Prof. Satis A. Shah, IC engines are a major

source of noise pollution. An engine noise is mainly due to exhaust noise. Suppressing of an engine exhaust noise has been a subject of interest for many years. Mufflers are used to minimize sound transmission caused by exhaust gases.

- [3] In 2010, Shital Shah, Saisankaranarayana K, Kalyankumar S. Hatti, Prof. D.G. Thombare, The purpose of this experiment was to conduct design and free free analysis of muffler system in order to determine the resonant frequencies of the system and suggest changes in the system design. For this analysis, Nastran software was used, In order to determine the resonance frequencies, were then compiled to determine which peaks were the most significant for the system. From the data, side baffles were selected as weak parts of the muffler. In order to minimize the effects of these resonance frequencies, the suggested design improvement is to add thickness and also add damping to the system.
- [4] In 2012, M, Rajasekhar Reddy & K. Madhava Reddy, The method adopted to predict the attenuation characteristics of the muffler predicts that transmission loss is minimum at resonance. Further, the fact that muffler is an acoustic filter and its performance varies with frequency is well confirmed. And, the transmission loss increases with the increase in number of chambers and the loss is uniform.

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- [3] 2010, Shital Shah, Saisankaranarayana K, Kalyankumar S. Hatti, Prof. D.G. Thombare, " A practical approach towards muffler design, development and prototype validation.
- [4] 2012, M, Rajasekhar Reddy & K.Madhava Reddy." Design and optimization of exhaust muffler in automobile " Journal no. ISSN 2277-4785 2010, Vol. 6, No.1, pp. 39-58.