REVIEWED OF NOISE CONTROL IN IC ENGINE

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Abstract: Noise control is becoming increasingly important for a wide variety of OEM designers. Examples of products that take noise control considerations into account during their design cycles include equipment such as computer hard drives, house appliances, material handling and transportation equipment etc. In the transportation market, which includes aircraft, ground and marine segments, the demand is for low noise level goals. Achieving these goals is of primary importance for OEM to be continue to be competitive or to keep a given supremacy in the market. The automotive industry has been a leader in the adsorption of noise control technologies. Methods in use for several years for the prediction of interior noise levels include finite element method (FEM), statistical energy analysis (SEA) boundary element analysis (BEA) etc. The internal combustion engine has mechanized the world. Since the early 1900s it has been our prime source of mechanical power. The vast number of internal combustion engines in the world today has resulted in air pollution, noise pollution etc.

Keywords: OEM, Longitudinal waves, Engine surface radiated noise.

1-INTRODUCTION

Industrialization, together with the needs of our modern society for various machines for Human comfort, fast travel and appliances for routine jobs in homes and offices, has led to increase in the levels of noise pollution almost everywhere. The harmful effects of noise are well-known. Exposure to high noise levels can cause hearing loss. Noise can also result in other ill affects such as general annoyance, loss of sleep, headache, stress, constriction of blood vessels and deterioration in work performance. Thus it is important to reduce noise levels as much as possible. Various techniques for noise control are available, and it is advisable to consider noise control methods at the design stage itself. Some noise control measures that can be adopted by the designer at the design stage are described in this article. In many situations the methods described can also be applied at the development stage or even later to control noise levels.

1.1DEFINITIONS OF SOUND

Sound can be defined as the perception of vibrations stimulating the ear. If scientifically taken into account, sound is a periodic disturbance in fluids density or in the elastic strain of a solid, generated by vibrating objects. These waves or vibrations propagate in two basic ways.

1. Longitudinal waves.
2. Transverse waves

2-NOISE SOURCE

There has been a direct relationship between the improvement in man’s physical standard of living and the degree of his development of machines. The industrial revolution was really a series of social and industrial transformations, beginning in England with the use of coal in place of charcoal for the smelting of iron, progressing through the stages of steam engines and electric motors and all the producing and processing made possible by these devices, of the age of gasoline, sea and air for various types of transportation. For that matter, sweeping mechanical progress witness automation and the utilization of nuclear energy; but with every new machine, a little noise is created, with every mechanism employed to do man’s work, some mechanical or electrical power is converted into acoustical power, so that with the rise of people’s standard of living there occurs also a rise in the noise level of people’s confines.

3-CLASSIFICATION BY NOISE CHARACTERISTICS

One typical engine noise classification technique separates the aerodynamic noise, combustion noise and mechanical noise.

1. AERODYNAMIC NOISE
2. COMBUSTION NOISE
3. MECHANICAL NOISE

AERODYNAMIC NOISE-aerodynamic noise includes exhaust gas and intake air noise as well as noise generated by cooling fans, auxillary fans or any other air flow.
COMBUSTION NOISE- combustion noise refers to noise generated by the vibrating surfaces of the engine structure, engine components and engine accessories after excitation by combustion forces.

MECHANICAL NOISE- mechanical noise refers to noise generated by the vibrating surfaces of the engine components and engine accessories after excitation by reciprocating or rotating engine components.

4-CLASSIFICATION BY ENGINE NOISE SOURCES

A second approach to the classification of piston engine noise involves the separation of engine noise into the following categories –
1. Exhaust system noise
2. Intake system noise
3. Cooling system noise
4. Engine surface radiated noise

5-NOISE EVALUATION DURING ACTUAL RUNNING

6-FEDERAL NOISE CONTROL PROGRAMMES

OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA):
OSHA was enacted in 1970 in an effort to ensure safer conditions for all workers. The act OSHA specifies the maximum noise level that a worker may be subjected to during a workday. The OSHA standard is based on a max: allowable steady-state level of 90dBA for an 8-hr day. When noise level exceeds 90dBA, the permissible duration of noise exposure is reduced.

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