IDENTIFICATION AND CONTROLING OF EFFECTS OF AUTOMOTIVE EXHAUST EMMISSION ON HUMAN ENVIRONMENT: THE USE OF BOARD DIAGNOSTIC SOLUTION

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Abstract

Automobile exhaust emission is a major challenge to human existence and her environment, and it is a major concern of environmentalists and automobile manufacturers. Cars and heavy duty vehicles exhaust contains chemicals that are hazardous to human health and has serious impact on the environment. Respiratory diseases, anemia, cancer and acidic rain are some of the consequences of the pollution to human and the environment. 70% of automobile technicians attest to the problems in a survey research in Ilorin metropolis on fuel related problems out of 100 petrol and diesel engine specialists. This paper therefore examined the effects of automobile exhaust emission on human environment and the need for regulations and equipments through the existing regulatory agencies to find the existing solution to these silent killer problems.

Keywords; Automotive Exhaust, Human Environment, Board Diagnostic, Solution and Effects

Introduction

When the fuel is burnt in the car engines, the main gases produced are carbon dioxide, carbon monoxide, hydrocarbons, nitrogen oxides and water. The main gas released from car exhausts; carbon dioxide is one of the major green house gases. With the large amount of carbon dioxide emitted to the atmosphere every day, the carbon cycle goes out of balance, and the carbon dioxide gas remains in the earth's atmosphere, trooping heat and contributing to global warming and climate change.

Air pollution caused by cars, medium and duty vehicles are of serious problems to the society. Emissions from automobile exhaust contains a range of toxic substances that causes pollution; incomplete combustion of fuel results in the production of carbon monoxide which accounts for about two third of the world carbon monoxide gases in the atmosphere (all.recycling.facts.com, 2012).

Nitrogen oxide released from cars accounts for about eight percent (8%) of global warming as a result of combusting fuel excessive temperature, a substance that is a major cause of acidic rain. Other air pollutants from car exhausts are harmful are soot, sulfur dioxide, benzene and formaldehyde (all.recycling.facts.com, 2012).

Engine Management

Engine management is the control of engine operation, and this ranges from simple carburetor to control the fuel with an ignition distributor with contact breakers to control the engine, to a very sophisticated electronic control system. The fundamental

task of an engine management therefore is to manage the ignition and fuelling as well as other aspects and to refine the basic control of an engine (Tom, 2000).

Automobiles manufactured before the early 80s are not electronically controlled totally, as a result, their emission status compliance are checked through the pipe of the exhaust. The instrument used for absorbing the measuring of a sample is known as engine fault analyzer with screen and printer.

According to (Wikipedia, 2012), automobiles manufactured since the early 80's are equipped with "smart" systems, known as on-board diagnostic. On-board diagnostic system was developed to give the vehicle owner or a technician access to state of health information of various vehicle sub-system. These systems are made up of various sensors and a computer that communicates its findings to vehicle owners through malfunctioning indicator light (MIL) and to the technician by means of diagnostic trouble codes in the automobile computer.

On-Board Diagnostic (OBD) Operation

The OBD systems monitors a variety of engine conditions and output while the vehicle is being driven. When the system detects a problem with the emission control system, a dash board light is illuminated indication 'check engine' or 'service engine soon'. A corresponding diagnostic trouble code is stored in the computer's memory documenting which emissions control component is experiencing the problem and under what conditions (Ebera & Jones, 2009).

Automobile Exhaust Emission

In a heat engine or internal combustion engine, the exhaust stroke is characterised by the release of carbon monoxide poisonous gas that pollutes the environment or habitat due to the release of these gases; hydrocarbons (HC) carbon monoxide (CO), oxides of nitrogen (NOX).

Particulates and Sulphere Oxides

The automobile industry designed a system that helps to regulate and control the emission level of carbon monoxide and other dangerous gases for the safety of the society. Thus, devices can be placed under these common categories such as:

(i) Air injection – pulse air system

(ii) Engine design modification – clean air

(iii) Spark timing

(iv) Exhaust gas recirculation system

(v) Catalytic converter system

Effects of Car Pollution

- **Respiratory:-** Car pollution aggravates lung diseases such as asthma and other pulmonary diseases, the pollutants from car can also cause burning of eyes, coughing and breathing difficulties.
- **Anaemia:-** Lead is a pollutant produced from burning loaded fuel, the pollutant

interferes with normal red blooded cells creation by reducing important enzymes in the body. Lead also damages red blood cell membranes and obstructs the cell metabolism, shortening the life span of individual cell. Thus summing up to cause anaemia which is simply described as shortage of blood in the body system,

- **Cancer:**- Benzene is one of the pollutants released by cars, these pollutants has linked to lower immunity and leukemia.

- **Acidic rain:**- Pollution from car exhaust contributes to the formation of acidic rain, the acidic rain gases of the exhaust dissolved in to form acidic rain. Acidic rain acidify water bodies, it also dissolve away certain amount of nutrients in soil and affects the growth of plants. Acid rain also increases decay building moment most especially roofing sheets. Water species are also affected by acidic rain because they cannot survive in water that contains high acidic level. Medium and heavy duty vehicles exhaust gases are lower than emission from petrol engines because of the excess air factor that ensures more complete burning of fuel. However, the particulate matter of carbon molecules that contain hydrocarbons and aldehydes and potentials danger because of the carcinogenic effects (Tom, 2000). Carcinogenic matters are responsible for lung cancer diseases.

Benefits of on-board Diagnostics

1. The no-board diagnostic (OBD) has gone through the series of technological modifications from the early 80's to date. The latest tagged OBD has the main

task through its system to monitor vehicle conditions and components that are related to vehicle emissions such as catalyst in the catalytic converter, engine misfire, engine coolant temperature and oxygen sensors.

2. On-board diagnostic (OBD) detects a vehicle malfunction before the driver becomes aware of the problem.
3. Early detection and repair of malfunctions will result in fewer emissions.
4. Early repairs of minor problems may prevent more significant and more expensive engine problems that could develop of left undetected (Palmer, 2012).

Benefits of on-board Diagnostic (OBD) to Environment

The intent of OBD systems is to ensure proper emission system operation for each and every vehicle and light truck during its life time by monitoring emission-related components and systems fir malfunction and or deterioration. An important aspect of OBD is its ability to notify the driver of problem before the vehicles emission increases significantly. If the vehicle is taken to a repair shop in a timely fashion, it can be properly repaired before any significantly emission increase occurs. OBD systems also provide automobile manufacturers with valuable feedback from their customers vehicles that can be used to improve the vehicle emission control system designs.

Benefits of on-board Diagnostic (OBD) to Customers

OBD (On-board Diagnostic) system are designed to alert drivers when something in the emission control system begins to deteriorate or fail. Early diagnosis followed by

timely repair can often prevent more costly repairs on both emission systems and other vehicle systems that may affect vehicle performance such as fuel economy. For example, a poorly performing spark plug can cause the engine to misfire, a condition sometimes unnoticed by the driver. This engine misfire can in turn quickly degrade the performance of the catalytic converter. With OBD detection of the engine misfire, the driver will be faced with a relatively inexpensive spark plug repair. However, without OBD detection, the driver could be faced with an expensive catalytic converter repair in addition to the spark plug repair.

Furthermore, manufacturers have increased incentives to build high-quality vehicles with better performance, reduced emissions, and more efficient power trains to prevent problems that can lead to OBD detection, OBD system also provides far more information than ever before to help auto-mobile technicians diagnose and properly repair vehicles during their first visit to the repairs shop, saving time and money for customers.

Statement of the Problem

Under certain conditions the MIL will blink or flash, this indicates a rather severe level of engine misfire. When this occurs, the driver should reduced the speed and seek for service as soon as possible because severe engine misfire over only a short period of time can seriously damage emission control system components, especially the catalytic converter which is expensive to replace. However, most drivers disregards the MIL light as only the changing of oil light that is regarded as a service.

Purpose of the Study

The general purpose of the study is to identify and control Automobile Exhaust Emission on Human Environment using on Board Diagnostic Solution. Specifically, the study will:

i. To intimate drivers on the dangers of ignoring the malfunctioning indicator light (MIL).

ii. To educate technicians on the correlation between MIL and exhaust emission.

Research Hypothesis

There is no significant relationship between engine management and exhaust emission.

Implications of the Result

The implication of the results from table A and B is that drivers are not aware of the effect their vehicle is having on the environment through the pollutants of their exhaust gases as a result of the engine management problem of fuel system. Also, the technicians do not have the needed equipments to read the codes in the computer of the vehicles to carry out the necessary repairs.

Conclusion

The combined factors of ignorance on the operational set up of the modern cars and medium and heavy duty vehicle, together with the non-availability o the necessary tools and equipment by the technicians to carry out proper diagnosis to effects necessary repairs reflects the stat of danger in terms of health and economic loss of

people and environment are exposed to, as well as the damage so many drivers have been made to pay for which are not necessary.

Recommendations

In line with international standards on the protection of environment and reduction of pollutant to reduce global warming to curb the adverse effects as expressed early in the literature, the following recommendations are suggested.

- Enactment of laws through the state and federal house of assembly on regulations for emission standard for cars, medium and heavy duty trucks manufactured before early 80s.
- A law enforcing the ban on vehicles without on-board diagnosis with programmed monitor on emission problem in the vehicle computer for all categories of vehicles.
- A law stipulating that all vehicles must pass emission standard tests and certificate issued for certain period of time before such vehicles could be on the road.
- Existing regulatory agencies life Federal Road Safety Commission, KWATMA (Kwara State Transport Management Agency), LASTMA (Lagos Transport Management Agency), Vehicle Inspectorate Office in every state of the federation should be empowered with latest technological tools and equipments to carry out tests and effect repairs on emission problems.
- Automobile technicians who have registered in their various associations should

be trained on the usage of tools and equipments as well as how to carry out repairs on the latest technology of automobiles of various automotive industries.

- Every automotive technicians should be issued with a certificate and license to practice after passing the training test/exam that should be organized by the federal road safety commission before they can practice their trade.

- The regulatory agencies retrain the existing manpower in their organizations on the latest technology in automobile industries to be able to handle effectively tests and repairs on emission of motor vehicles.

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