Fabrication of Automatic Air Filter Cleaning System: A Review

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Abstract — For any engine there is necessary to prevent the impurities from air so that engine should run smoothly. So for that we are using air filter. The Air filters are used for heavy construction equipment such as diesel engine or diesel cycle. For those which are used in little polluted area like in mines, industries air filter is important criteria. The air filter should be inspected, clean, and/or replaced every 30000km. These filters are specially constructed to allow a higher volume of air yet still filter out any debris. This is the reason a diesel air filter is much more expensive. As per our survey the air filter is clean by manually and it will take too much time to clean it or sometimes due to laziness of worker they do not clean properly. Sometimes because of manually cleaning it may be damage.

Keywords— About five key words in alphabetical order, separated by comma.

I. Introduction

Despite enjoying nearly ten years of globalizations, most of the Indian automobile manufacturer steel follow the customize mass production (batch mode) system. Consequently they suffer from abnormally high inventory levels, high cycle times and enormous wastage. It results in increase inventory cost, which in turn elevate cost of production. And the high cycle time lead to reduced customer satisfaction. Manufacturer can not afford the comp lances that they enjoyed in the pre liberalizations era. Why? Because the global villages are continuously spreading with new players and innovations, taking the competitions and quality standards to a new height.

Given this scenario, it is high time the automobile manufacturer quit the traditional path and plunged in to something more innovative and productive. The lean manufacturing technique is a tried and tested system that carries many promises for the Indian automobile manufacturer.

Over the past 10 years or so, lean manufacturing has been receiving an increasing amount of attention as one source for productivity improvements and cost reductions in manufacturing. Hailed by its proponents as a breakthrough means to analyze and improve production and the factory floor environment, lean manufacturing is abroad collection of principles and practices that can improve corporate performance. The argument is that lean manufacturing offers revolutionary rather than evolutionary efficiency improvements.

An air filter cleaner is a device which removes solid particulates such as dust, pollen, mold and bacteria which is collected from the air. Air filters are used in application where air qualities are important, notably in building ventilation system and in engines such as internal combustion engines, gas compressor gas turbine and other. An air filter is an important part of intake system of an automobile because it is through the air filter that the engine “Breaths”. An engine needs an exact mixture of fuel and air in order to run, an all of the air enters the system first through the air filter. The air filter purpose is to filter out the dust and other foreign particles in the air, preventing them from entering the system and possibly damaging the engine. An air filters is a generally made up of fibrous material, pleated accordion-style. An air filter can also be made of cotton or fabric like materials which is then oiled in order to increase air flow to the filters.

The air filter cleaner is a de-clogging device. It is composed of two main components i.e. pressure vessel (storing air pressure/ air compressor) and triggering mechanism (high speed release of compressed air). It is a machine which cleans the air filter automatically by using c-programming and electronic circuit. The present project is directed to an air filter cleaner which may be used on a job site to clean the air filter of construction equipment and vehicle during normally scheduled downtime. In the past, this air filter element where either cleaned by the other person to have a filter clean. This manual cleaning process of spraying the compressed air from the hoses.

This process was very time consuming and requiring a lot of time and labor to clean the filter. Another problem is that due to this cleaning process the filter was damaged and became useless. An air filter cleaner is a device which removes solid particulates such as dust, pollen, mold and bacteria which is collected from the air. Air filters are used in application where air qualities are important, notably in building ventilation system and in engines such as internal combustion engines, gas compressor gas turbine and other. An air filter is an important part of intake system of an automobile because it is through the air filter that the engine “Breaths”. An engine needs an exact mixture of fuel and air in order to run, all of the air enters the system first through the air filter. The purpose of the air filter is to filter out the dust and other foreign particles in the air, preventing them from entering the system and possibly damaging the engine. An air filter is a generally made up of fibrous material, pleated accordion-style. An air filter can also be made of cotton or fabric like materials which is then oiled in order to increase air flow to the filters.

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time invested in the cleaning of an air filter would be a complete loss. Therefore, in the view of these hazards and the high cost of labor. The present invention eliminates the problem previously encountered. The present invention used the daily cleaning of air filters on heavy construction equipment during normally scheduled downtime.

II. Objective
1. To study existing air filter cleaning system
2. To reduce the changing frequency of used air filter in the vehicle
3. To reduce cost of Air filter Cleaning System
4. To increase the reliability of Air filter.

III. Literature Review
[1] B. PAVAN KUMAR GOUD, DR. S. CHAKRADHARA GOUD, studied on Experimental and Numerical Study on Performance of Air Filters for Diesel Engine, and found that the air filters in an air intake system permanently removes foreign particles such as dust, dirt and soot from the intake air, thereby maintaining the performance of the engine and protecting it from damage. Proper maintenance can help vehicles perform as designed, thereby positively affecting fuel economy, emissions, and overall drivability. This paper addresses the issues of air filters replacement. Older studies of carbureted gasoline vehicles have indicated that replacing a clogged or dirty air filter can improve vehicle fuel economy and, conversely, that a dirty air filter can be significantly detrimental to fuel economy. In contrast, a recent study showed that the fuel economy of modern gasoline vehicles is virtually unaffected by filter clogging due to the closed loop control and throttled operation of these engines. Because modern engines operate without throttling, a different result could be anticipated. This paper describes the measured results with focus on changes in vehicle fuel economy but also includes performance. The effects of air filters performance were studied and the analysis is carried out with the different diesel engine of cleaned air filters.

[3] Krunal K Parmar, Shailesh M Patel studied on an Effect of Atmosphere on Fuel Economy & Air Consumption through Clogging of an Air Filter & found that Auto motive is self-propelled power generating device which used atmospheric air to optimize the complete combustion of a fuel. In today’s world utilization of automotive is increases as well as increase of pollution with industrial development. Recently due to increase in rapid development of industries increase the number of automotive used to achieve the requirement. To increase the efficiency expects of designing it should be focus to achieve a complete combustion of fuel to improve an efficiency of an engine. Efficiency of an engine depends upon combustion of a fuel that mainly depends upon the supply of Stoichiometric air. Air is supplied through air filter but due to different climate condition clogging of air filter reduce the supply of an air. This reduction of air to engine leads to loss of fuel due incomplete combustion and increase economy loss.

[4] Dharm Dutt, A.K.Ray, C.H.Tyagi, J.S.Upadhyay & Mohan Lal studied on Development of Specialty Paper is an art: Automobile filter paper from Indigenous raw materials and found that The major obstacle for the development of various types of filter papers is the shortage of good quality of fibres in order to impart properties like mean pore diameter, micron rating, optimal porosity and general wet web strength for run ability of machine and non-availability of technology. The study aims at developing various kinds of filter papers from raw materials available plentifully in INDIA.

[5] Maris Gailis, Vilnis Pirs studied on RESEARCH IN INFLUENCE OF ENGINE AIR FILTER REPLACEMENT PERIODICITY and found that the study evaluates current periodicity of engine air filter replacement to determine the influence of this operation on some vehicle performance parameters. The experience of usage, costs of exploitation and
technical condition of the vehicle are connected with a technically and economically based system of technical servicing. Periodicity of motor air filter replacement, declared by the automobile manufacturer Renault ranges from 30 000 km to 120 000 km, depending on the model and engine type. According to the same recommendations, periodicity must be reduced by a half, if conditions of use include dusty roads and exploitation of the vehicle in urban conditions.

[6] De Amaral, T., Zeller, A., de Azevedo, E., Yoshino, F. et al studied on Air Cleaner Performance Improvement through Multicyclones and found that Air cleaners are used in a wide range of automotive applications. From passenger cars to heavy duty trucks, there is always an air cleaner to keep inlet air free of impurities and air flow passage obstruction in low levels. Today's automotive air intake systems are developed to deliver maximum filtration efficiency, maximum dust holding capacity and maximum service interval range based on engine performance and reliability requirements. In Brazil, some applications require outstanding performance for the air cleaners. One of them is at harvester application. In this case, vehicles are exposed to thin soil particles in high quantities due to harvester movement at plantation work.

[7] Dipak C. Talele, Dr. Dheeraj S. Deshmukh, Dr. Prashant P. Boranare studied on A Review on Effect of Air Induction Pressure Variation on Compression Ignition Engine Performance and found that Owing to Concern of environmental pollution and energy crisis all over the world, research interest on reduction of diesel engine exhaust emissions and saving of energy is increasing. Because of Better fuel economy and higher power with lower maintenance cost, the popularity of diesel engine vehicles has been increased. Diesel engines are more economical than any other source in this range for bulk movement of goods, powering stationary/mobile equipment, and to generate electricity. The air induction system plays important role in combustion process by providing necessary air charge in case of Compression Ignition (C.I.) engine. It is observed that due to increased inlet air pressure results in better mechanical efficiency, volumetric efficiency, scavenging and reduced exhaust temperature at the engine exhaust thereby reduced oxides of Nitrogen.

IV. Result

[1] From the literature review, we found that a system is requiring which consolidate the cleaning of air filter in one stage & at one place

[2] Thus we conclude that by using such setup the frequency of changing filter will reduce as well as the durability of filter is increase.

References


