International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 3 Mar 2022, pp: 01-05 www.ijaem.net ISSN: 2395-5252

Decreasing Emissions from Exhaust Gases through EGR and Oxygen Injection

K. Sriram, D. Sravan, M. Prasad Kumar, M. Manideepika, Y. Hari Krishna, G. Vishnu Teja

[1,2]*Student, Sri Krishnadevaraya University College of Engineering and Technology, Anantapur, Andhra Pradesh*

Submitted: 01-03-2022 Revised: 07-03-2022 Accepted: 10-03-2022

ABSTRACT: In this project we are using the exhaust gases which are coming from the engine and decrease the amount of emissions from the exhaust gases by using the EGR and Oxygen injection. The exhaust gases from the exhaust valve will recirculate into the inlet manifold of the engine cylinder by using the method of EGR (exhaust gas recirculation) which will provide high temperature to the inlet gases, it provides more rate of combustion in the combustion chamber. The engine efficiency will be increased greatly and Nitrogen oxides are highly reduced in this exhaust gases by using EGR. After this process the remaining gases are delivered into the exhaust manifold to reduce the Carbon monoxides, Sulphurs, and other hydro carbons, here we introduce the oxygen gas into the exhaust manifold combustion chamber, this results in the reaction between the oxygen and the exhaust gases which converts the monoxides into dioxides. These gases are then filtered by a Zeolite film which are arranged after the catalytic convertor before the muffler. These films can absorb carbons, hydrogen and Sulphur atoms and release the harmless gases to the atmosphere.

KEYWORDS:EGR system, Oxygen injection, Zeolite films, Exhaust gas.

I. INTRODUCTION

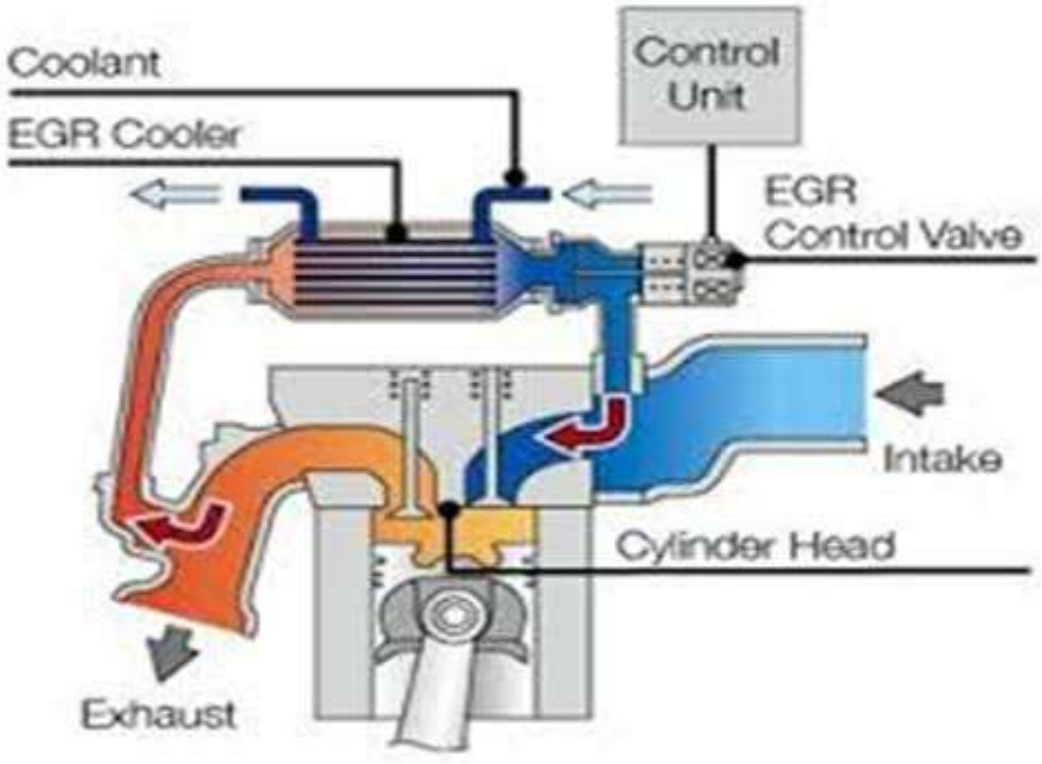
Automobiles plays an important role in the transport system. With an increase in population and living standard, the transport vehicles along with emission pollution vehicle population is increasing day by day. In addition to this there is steep increase in the number of two and four wheelers during the last two decades. All these are increasing exhaust pollution particularly in metros as density of these vehicles in metros are very high and threatening to the ecosystem. The main pollutants contributed by the engines are CO, Nitrogen oxides, unburned hydro- carbons and other particulate emissions. Other sources such as Electric power stations industrial and domestic fuel consumers also add pollution like CO, SO2, and particulate matters. In addition to this, all fuel burning system emit CO2 in large quantities and this is more concerned with Green House Effect which is going to decide the health of earth.

II. THEORITICAL DESCRIPTION

EGR System

In internal combustion engines, the Exhaust gases recirculation (EGR)is a method to control Nitrogen Oxides (NOx) emissions, produced during the combustion process. Air from the environment, mostly a combination of Oxygen and Nitrogen, combines with fuel and ignites inside the combustion chamber, temperatures increase and produce NOx emissions. The EGR system works by returning to a small portion of exhaust gas to the engine's combustion chambers through the intake manifold, lowering combustion temperatures and therefore reducing the amount of NOx emitted.

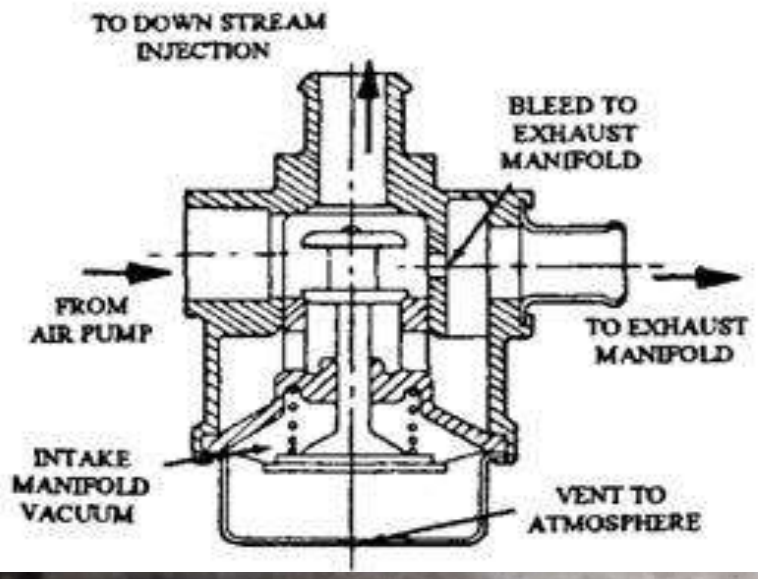
International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 3 Mar 2022, pp: 01-05 www.ijaem.net ISSN: 2395-5252



OXYGEN INJECTION

The oxygen injection system is a kind of injection which injects the required amount of oxygen to the reaction chamber. The reaction chamber is the place where the exhaust gases meet the injected oxygen here the gases get combusted I.e., the unburnt fuel mixture released from the exhaust valve are burned by the means of the oxygen injected. These results in the monoxides to convert into the dioxides.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 3 Mar 2022, pp: 01-05 www.ijaem.net ISSN: 2395-5252



CATALYTIC CONVERTER

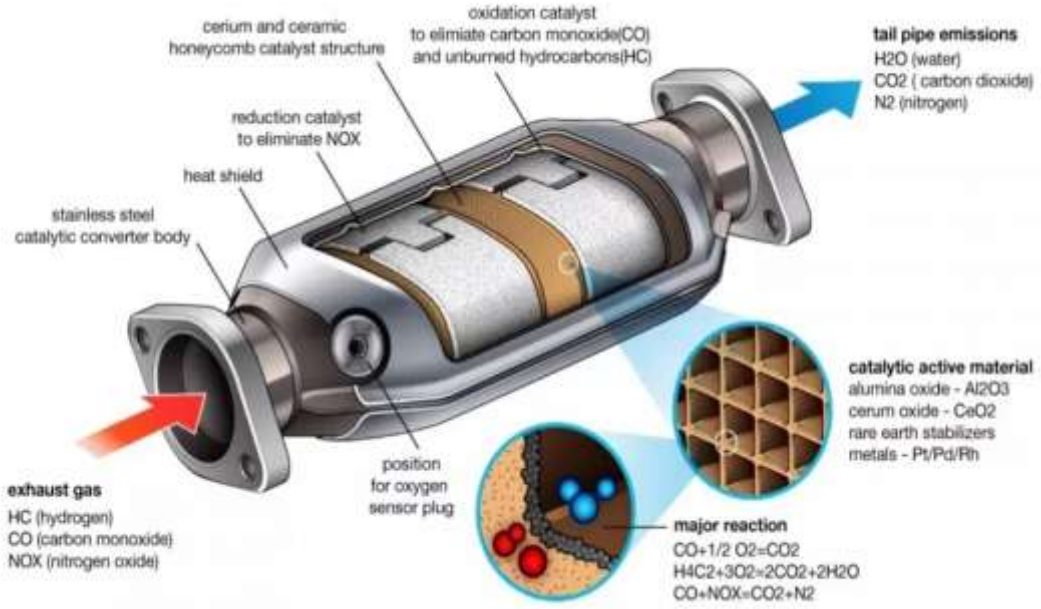
A catalyst is simply a chemical that makes a chemical reaction go faster without itself changing in the process. It's a bit like an athletics coach who stands by the side of the track and shouts at the runners to go faster. The coach doesn't run anywhere; he just stands there, waves his arms about, and makes the runners speed up. In a catalytic converter, the catalyst's job is to speed up the removal of pollution. The catalyst is made from platinum or a similar, platinum-like metal such as palladium or rhodium.

A catalytic converter is a large metal box, bolted to the underside of your car, that has two pipes coming out of it. One of them (the converter's "input") is connected to the engine and brings in hot, polluted fumes from the engine's cylinders (where the fuel burns and produces power). The second pipe (the converter's "output") is connected to the tailpipe (exhaust). As the gases from the engine fumes blow over the catalyst, chemical

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 3 Mar 2022, pp: 01-05 www.ijaem.net ISSN: 2395-5252

reactions take place on its surface, breaking apart the pollutant gases and converting them into other gases that are safe enough to blow harmlessly out into the air.

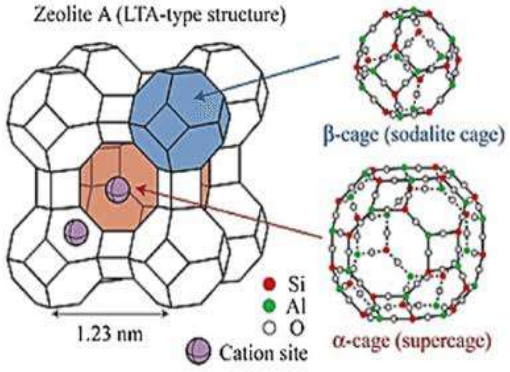
One very important thing to note about catalytic converters is that they require you to use unleaded fuel, because the lead in conventional fuel "poisons" the catalyst and prevents it from taking up the pollutants in exhaust gases. Inside the converter, the gases flow through a dense honeycomb structure made from a ceramic and coated with the catalysts. The honeycomb structure means the gases touch a bigger area of catalyst at once, so they are converted more quickly and efficiently.

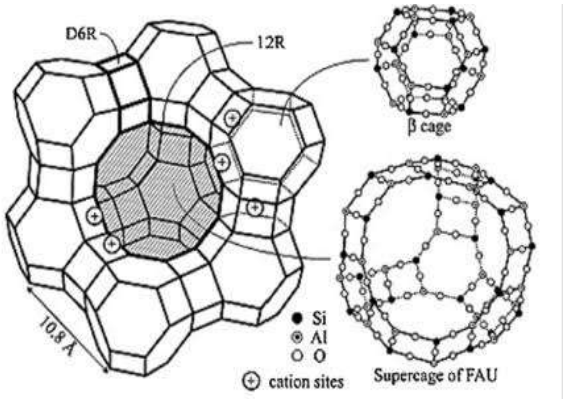


ZEOLITE FILM FILTER

Zeolites are microporous, aluminosilicate minerals commonly used as commercial adsorbents and catalysts. The term zeolite was originally coined in 1756 by Swedish mineralogist Axel Fredrik Cronstedt, who observed that rapidly heating a material, believed to have been stilbite, produced large amounts of steam from water that had been adsorbed by the material. Based on this, he called the material zeolite, from the Greek (zéō), meaning "to boil" and (líthos), meaning "stone". The classic reference for the field has been Breck's book Zeolite Molecular Sieves: Structure, Chemistry, And Use. Zeolites occur naturally but are also produced industrially on a large scale. As of December 2018, 253 unique zeolite frameworks have been identified, and over 40 naturally occurring zeolite frameworks are known. Every new zeolite structure that is obtained is examined by the International Zeolite Association Structure Commission and receives a three letter designation

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 3 Mar 2022, pp: 01-05 www.ijaem.net ISSN: 2395-5252





III. CONCLUSION

Looking back on this project, the overall outcome of results to be observed. This can be evaluated by looking at how well our objectives were met. Our objective is to control the emission of exhaust gases by using the EGR and Oxygen injection system and increase the overall efficiency of the engine. The percentage of the pollutants in the exhaust gases are greatly reduced

SOME OF THE ADVANAGES FROM THE ABOVE RESULTS

a) Increased Mechanical efficiency
b) Fuel economy Increases
c)Power and Torque increase
d) decrease in emissions from exhaust gases

REFERENCES

[1]. Juhi Sharaf "Exhaust Emissions and Its Control Technology for an Internal Combustion Engine" International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 Vol. 3, Issue 4, JulAug 2013, pp.947-960

[2]. Branislav Sarkan, Ondrej Stopka, Jozef Gnap, Jacek Caban" Investigation of Exhaust Emissions of Vehicles with the Spark Ignition Engine within Emission Control" Science directProcedia Engineering 187 (2017) 775 – 782

[3]. "Zeolite Structure". GRACE.com. W. R. Grace & Co. 2006. Archived from the original on 15 February 2009. Retrieved 8 Feb 2019