

## **BLUETEC TECHNOLOGY**

**Bhushan Pawar<sup>1</sup>, Mayur Pawar<sup>2</sup>, Kuvarjitsingh Pawar<sup>3</sup>**

<sup>1,2,3</sup>*Department of Mechanical Engg., BVCOE&RI, Nashik(India)*

### **ABSTRACT**

*Nowadays, people's concern regarding the setting is raised everywhere, particularly regarding pollution. Its adverse effects are pervasive and should be disaggregated at 3 levels: (a) native, confined to urban and industrial centers; (b) regional, concerning Trans boundary transport of pollutants; and (c) world, associated with build from greenhouse gases. These effects are discovered globally however the characteristics and scale of the pollution drawback in developing countries aren't known; nor has the matter been researched and evaluated to constant extent as in industrial countries. Pollution, however, will not be considered an area or a regional issue because it has world repercussions in terms of the atmospheric phenomenon and depletion of the layer. There are completely different scales of pollution: world (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, CFCs), continental (SO<sub>x</sub>, NO<sub>x</sub>), regional (fly ash, chemical smog), native (large particulates). The fuel utilized in diesel engines encompasses a higher boiling purpose than that utilized in petrol engines. Additionally, the A/F mixture in diesel engines is made quickly simply before combustion starts and is so less uniform. Diesel engines operate with excess air across their entire operative vary. And poor amount of excess air ends up in increased particulate emissions (soot), and CO and HC emissions. NO<sub>x</sub> could be a generic term for mono-nitrogen chemical compounds NO and NO<sub>2</sub> (nitric oxide and element dioxide). They're made from the reaction of element and chemical element gases within the air throughout combustion, particularly at high temperatures. In areas of high motorcar traffic, like in giant cities, the quantity of element oxides emitted into the atmosphere as pollution is important. NO<sub>x</sub> gases are fashioned everywhere wherever there's combustion – like in AN engine. In part chemistry, the term means that the whole concentration of NO and NO<sub>2</sub>. NO<sub>x</sub> react to create smogginess and air pollution. Nox also are central to the formation of tropospheric gas. NO<sub>x</sub> shouldn't be confused with inhalation general anesthetic (N<sub>2</sub>O), that could be a greenhouse emission and has several uses as an oxidant, an Anesthetic, and a food additive.*

**Keywords:** *Blue Tec technology, Exhaust gases, SCR converter, emissions control, less pollution*

### **I. INTRODUCTION**

Mercedes-Benz launched this distinctive initiative at the monocot genus 2006 in metropolis. The Stuttgart-based manufacturer with the world's longest diesel tradition unveiled 2 vehicles that paved the method for AN all-new diesel vehicle generation: the E 320 BLUETEC and also the Vision GL 320BLUETEC. Mercedes-Benz has changed specific aspects of the economical, powerful and sturdy 320 CDI engine, adding progressive emission-control technology to form it the cleanest diesel within the world. Mercedes-Benz has so remodeled the diesel motor into a clean and future-compatible system. That system is named BLUETEC. The objectives are clear: innovative exhaust gas after-treatment strategies provide Mercedes Benz diesel engines the potential to fits the



world's most tight emission standards and to be accessible all told fifty U.S. states. In different words, Mercedes Benz are ready to provide the cleanest diesel within the world in each vehicle class. BLUETEC is that the name for this new generation of high-tech diesel drives that may at first be launched within the U.S. BLUETEC is that the latest innovation for low emission levels and goes to any advance the powerful however low-emission drive towards the long run. These high-tech vehicles, that observe ecological sense and are endowed with enticing driving qualities, offer a solution to the queries of the vehicle ideas of tomorrow. Within the standard BLUETEC system, Mercedes-Benz has place along a technology package for returning vehicle generations. Its foundation is that the diesel history of the complete. Over decades, the diesel more and more has become a clean, powerful, high-speed drive unit, nonetheless has preserved its economical nature. Originally it had been this economic potency and hardiness which inspired contemporaries; nowadays the diesel motor is a very low-emission power station with gaudy characteristics. Consequently, within the face of more and more tight emissions standards, this compression-ignition engines represent another to petrol engines quite they ever did. The market reflects this development: within the in the meantime each second automobile oversubscribed in Western Europe could be a diesel automobile. Mercedes-Benz even sells fifty four % of its cars with a compression-ignition engine below the hood. Blue Tec could be a trademark name employed by Mercedes-Benz to explain its diesel motor exhaust treatment system. So as to stay up with the steady evolving and more and sterner emissions laws of North America and Europe, the corporate has designed and free 2 versions of this technique. Version one was free for the U.S. market within the kind of the 2007 E320 BlueTec sedan and was designed to utilize, the then recently introduced, extremist Low Sulfur Diesel (ULSD). As a next step, Mercedes-Benz has free the additional refined R, cubic centimeter and GL320 series BlueTec's with Ad Blue injection diesels that meet America's stern BIN five emissions standards and are on-track to qualify for Europe's EU6 parameters. So we will say BlueTec is Daimler Chrysler's name for its 2 oxide (NO<sub>x</sub>) reducing systems, to be used in their Diesel automobile engines. This technique makes these vehicles 45-state and 50-state legal severally within the u. s., and is anticipated to satisfy all emissions rules through 2009. It additionally makes Daimler Chrysler the sole auto maker within the U.S. committed to merchandising diesel models within the 2007 model year.

There are 2 variants of this technology:

- BlueTec with DeNO<sub>x</sub> converter
- BlueTec with Ad Blue injection

## II. LITERATURE REVIEW

Rudolf Diesel is attributable with the invention of the diesel motor that operates on a no-external-ignition cycle that bears his name. Rudolf Christian Karl Diesel was born in Paris in 1858 into a family of German expatriates. He was educated at city tech. when graduation he was utilized as an icebox engineer, however his true love lay in engine style. Diesel designed several heat engines, as well as a solar-powered air engine. In 1892 he received patents in Germany, European country, the uk and filed within the u.s. for "Method of and equipment for changing Heat into Work". His engine was the primary to prove that fuel might be en-kindled alone with high

compression. At Augsburg, on August ten, 1893, Rudolf Diesel's prime model, a single 10-foot (3.0 m) iron cylinder with a regulator at its base, ran on its own power for the primary time.

By 1967 the State of California created the Air Resources Board in 1970, the federal United States Environmental Protection Agency was established. Both agencies, as well as other state agencies, now create and enforce emission regulations for automobiles in the United States.

Similar agencies and regulations were contemporaneously developed and implemented in Canada, Western Europe, Australia and Japan.

#### **IV. PROPOSED SYSTEM**

Various Stages operational of BlueTec

Stage one - Removing CO and turn Fuel

Exhaust emissions from the engine enter the Diesel chemical reaction Catalyst (DOC) to cut back the quantity of CO and turn fuel (hydrocarbons).

Stage a pair of - Removing particulate

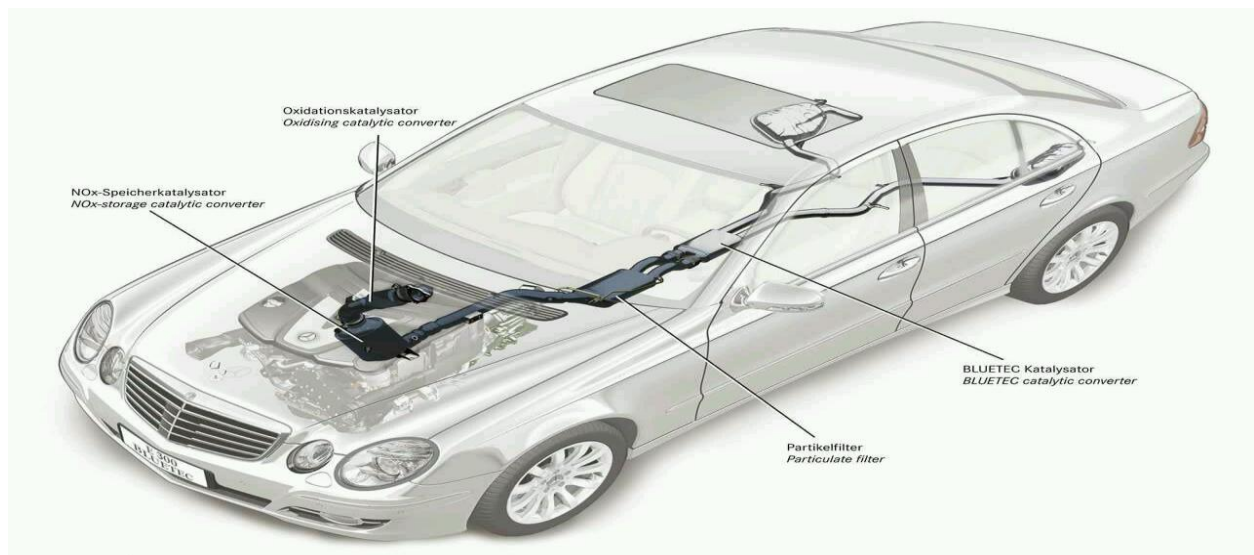
A diesel particulate filter traps the diesel particulate.

Stage three - Ad Blue Injection

As the exhaust gases exit the diesel particulate filter, it mixes with the Ad Blue diesel exhaust fluid.

Stage four - Removing oxide

In the ending, the exhaust enters the SCR converter that additionally consists of a deNOx converter to create harmless element and vapor.



**Figure 3.1: Schematic dig. of bluetec technology**

#### **STAGE- I**

The first stage consists of a basic converter that consists of honeycomb monolithic ceramic structure, coated with atomic number 78 and panned during a steel packing. During this stage, the global organization burnt fuel (HC) and CO (CO) are change to carbonic acid gas and Water.



## STAGE – II

This stage consists of a Diesel Particulate Filter that has pressure sensors at the water and outlet of the filter monitor the standing of the filter. Once it's full, the system triggers a rise within the exhaust temperature. The recent exhaust then purges the filter in pulses lasting roughly a pair of to4 seconds, burning off the actual matter and soot. These pulses last for many minutes.

## STAGE – III

Third Stage consists of injection of Ad Blue answer to the downstream exhaust gases that are beginning of the Diesel particulate entice. Ad Blue is AN liquid organic compound answer that's carried during a separate tank. Once Ad Blue is injected into the pre-cleaned exhaust gas, ammonia (NH<sub>3</sub>) is free, inflicting the element oxides to react and be regenerate into harmless element (and water) during a downstream converter.

## STAGE – IV

In the ending, the exhaust enters the SCR converter, wherever the ammonia reacts with the oxide and also the catalyst within the SCR that consists of a deNO<sub>x</sub> converter to create harmless element and vapour – each of that occur naturally within the air we tend to breathe.

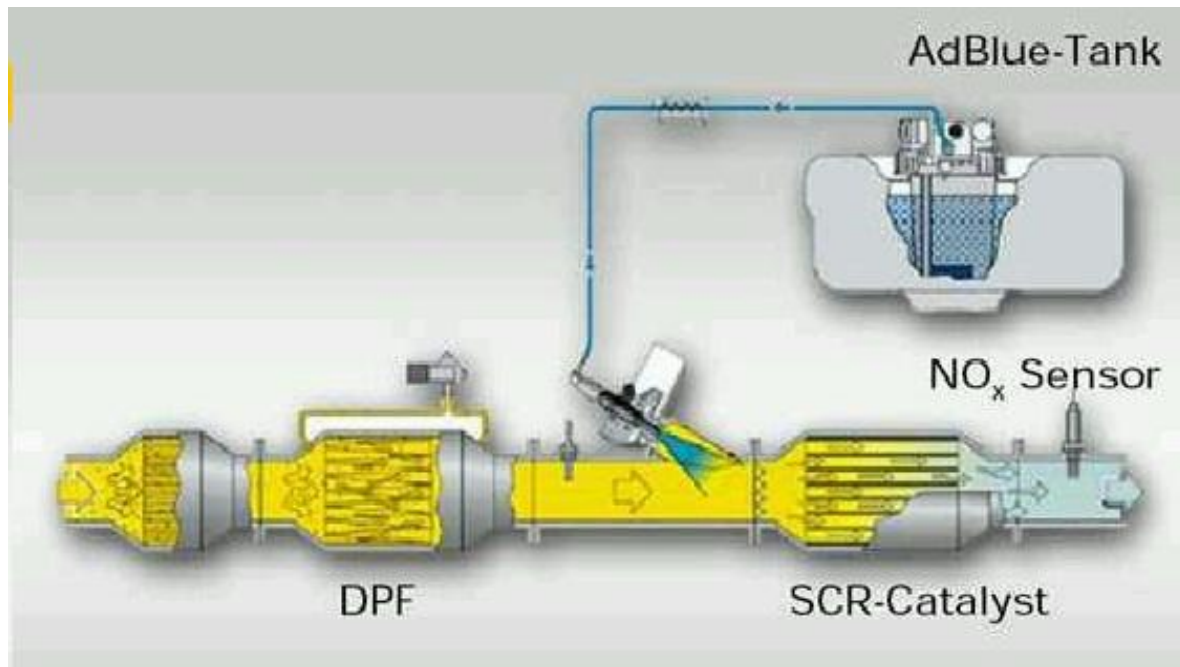
### •SCR Systems:

A Selective chemical change Reduction (SCR) system uses a metal like or ceramic wash-coated catalyzed substrate, or a homogeneously extruded catalyst and a chemical reducing agent to convert element oxides to molecular element and chemical element in oxygen-rich exhaust streams like those encountered with diesel engines. In mobile supply applications, AN liquid organic compound answer is typically the popular reducing agent. Upon thermal decomposition within the exhaust, organic compound decomposes to ammonia that is the reducing agent. In some cases ammonia has been used because the reducing agent in mobile supply retrofit applications. As exhaust and reducing agent omit the SCR catalyst, chemical reactions occur that cut back No<sub>x</sub> emissions to element and water. SCR catalysts is combined with a particulate filter for combined reductions of each PM and No<sub>x</sub>.

### •De Nox converter:

It is positioned downstream of the chemical reaction converter and also the particulate filter and encompasses a special coating that captures the nitric oxides within the stream of exhaust gas. The No<sub>x</sub> storage converter has 2 completely different operative modes: in traditional lean operation ( $\lambda > 1$ ), NO is 1st change to create NO<sub>2</sub> so, via nitrate formation (NO<sub>3</sub>) hold on within the converter on AN metallic element chemical compound (e.g. atomic number 56 oxide). The \$64000 challenge with the No<sub>x</sub>

Storage converter is regeneration, i.e. the periodic evacuation of the accumulator. To regenerate the accumulator, wealthy exhaust-gas conditions ( $\lambda < 1$ ) should be set. Below these operative conditions, the exhaust gas contains most reduction agent (carbon oxide, chemical element and varied hydrocarbons) that the nitrate bond is suddenly dissolved and reduced to non-toxic element (N<sub>2</sub>) directly on the noble-metal-coated converter.



**Figure 3.2: SCR + DeNOxtronic system**

## V. CONCLUSION

Thus we will conclude that, BlueTec is one among the foremost milestones in achieving cleaner diesel emissions, serving to cope up with increasingly stringent emission norms. It helps cut back Nox emissions by up to eightieth. We can accomplish higher fuel economy that successively reduces the dependency on oil imports, thereby saving valuable exchange. Also by introduction and usage of extremist Low Sulphur Diesel (ULSD) Sox emissions is block, thereby reducing the foul smell of diesel exhaust. Thus, we will say that BlueTec is unquestionably the Diesel Technology for future.

## ACKNOWLEDGEMENT

We would like to convey our gratitude and respect to our resourceful guide, mentor, Prof. A. G. chine, Department of Mechanical Engineering, BVCOE&RI, Nashik for his valuable guidance and support which was instrumental for the successful completion of the seminar.

We would like to express our sense of gratitude to Prof. D.D. Patil, Head of the Department, Mechanical Engineering Department, Prof. C.K. Patil, Principal, BVCOE&RI, Nashik. It was their constant encouragement and inspiration that enabled us to successfully complete the seminar work.

We would also like to thank the entire teaching faculty, non-teaching staff, our friends and family who continue to support us in all of our endeavors.

**REFERANCES**

- [1] Bosch Automotive Handbook, 5<sup>th</sup> Edition, Robert Bosch GmbH, Stuttgart.
- [2] Internal Combustion Engines, Mathur and Sharma
- [3] Overdrive Magazine.
- [4] SAE Paper 2004-01-1791: Progress in the Development of Tier 2 Light-Duty Diesel Vehicles
- [5] EPA: Urea SCR Certification & Compliance Considerations
- [6] "NOx Removal". Branch Environmental Corp. Archived from the original on 2007-10-08. Retrieved 2007-12-26.
- [7] "Health and Environmental Impacts of NOx". United States Environmental Protection Agency. Retrieved 2007-12-26.
- [8] SAE Technical paper - BLUETEC Diesel Technology C. Enderle, G. Vent and M. Paule, Daimler AG