Design and Fabrication of a Modular Retro-fittable Diesel Particulate Filter with Regeneration Attributes

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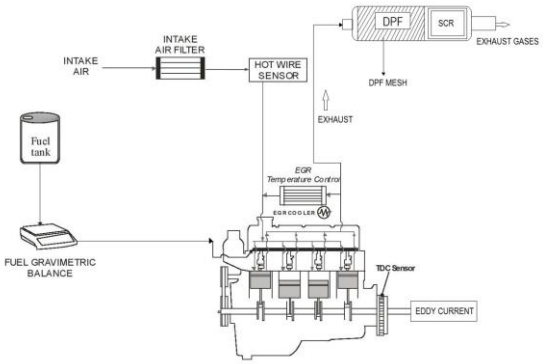
Abstract

In recent years air pollution has emerged as a major public health nuisance. The condition is abysmal in metropolitan cities like Delhi, Beijing etc. where smog isn't an isolated event anymore, air purifiers have become an essential household appliance and airborne diseases are on a rise. Tailpipe emission is one of the major contributor to this problem.

We managed to design and fabricate an effective particulate matter reduction mechanism for diesel engines with effective regeneration, and efficient NOx reduction mechanism, providing suitable method to reduce harmful emission from exhaust due to environmental concerns and to achieve Bharat Stage 6 emission control standards within considerable cost and maintenance level for old and new vehicles by the earliest. The system is modular and able to be installed to a wide variety of vehicles plying on Indian roads. India is a very price sensitive market and the aim was to find a balance between our climatic responsibility towards nature and still being realistic about the feasibility. Economic costs incurred in adopting newer standards is quite considerable and hinders its adoption in a market as price sensitive as India. Need of the hour is an air filter system that can be installed in the tailpipe of the vehicle. If this system is retro-fittable to previous generation vehicles, it can help them run cleaner as well. It can also reduce the R&D costs incurred by the automaker and help it to enforce the standards.

As a result of our endeavors, we were able to achieve a reduction in Particulate Matter up to 45% and reduction in NOx up to 35%. All this was achieved with a performance tax of less than 7%.

Image



Recent Publications

1. M. Okubo, T. Miyashita, T. Kuroki, S. Miwa and T. Yamamoto, "Regeneration of diesel particulate filter using nonthermal plasma without catalyst," in IEEE Transactions on Industry Applications, vol. 40, no. 6, pp. 1451-1458, Nov.-Dec. **2004**.

2. Regulated and Non-Regulated Pollutants Emitted during the Regeneration of a Diesel Particulate Filter
George Bikas, and and Efthimios Zervas, Energy & Fuels 2007 21 (3), 1543-1547 DOI: 10.1021/ef070024s

3. Jinke Gong, Tao Chen and Junhao Jiang **2015** Effects of pore structure on diesel particulate filter regeneration Chinese Journal of Environmental Engineering 9 2341-46 etc.

4. Effect of Pore Structure on Soot Deposition in Diesel Particulate Filter. Kazuhiro Yamamoto and Tatsuya Sakai Department of Mechanical Science and Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya-shi, Aichi 464-8603, Japan. *Computation* **2016**, *4*(4), 46; doi:10.3390/computation4040046

5. Yamamoto, K.; Yamauchi, K. Numerical simulation of continuously regenerating diesel particulate filter. Proc. Combus. Inst. **2013**, 34, 3083–3090.



Biography

Vipul Sehgal has research interest and passion for improving the air quality in modern metropolitan cities. The aforementioned system was developed using his mechanical engineering background and various projects undertaken in the field of Design and Automobile engineering. His work focuses on using novel ideas to solve existing air quality issues keeping in mind all the existing stakeholders. His other works include automated hydroponics based air purification system.