

# International Journal of Innovative Research in Science, Engineering and Technology

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## Intercoolant on Airfilters in Diesel Engine

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**ABSTRACT:** Now a days diesel engine plays an vital role in the automobile industry and also the importance of the air induction system has recently increased because of the governmental engine exhaust particulate and evaporative emission regulations. This has created a renewed interest in optimizing the existing parameters of the air induction mechanism like the air filter, filter box, piping, etc for better performance. Air filter provided on the engine intake is subjected to increase the level of abuse due to the reverse driving condition. The air filter in modern vehicles is usually a paper type air filter due to the increased presence of low quality air filter in the market, there is a possibility of getting premature clogging.

The introduction of inter coolant setup in the air filtration stage results in the reduction of clogging. This study improves the fuel economy by increasing the pressure drop in diesel engine powered vehicles. The performance of the inter coolant setup in terms of the pressure drop, fuel economy, emissions and mechanical efficiency are also studied.

**KEYWORDS:** Air filter, Diesel engine, Emission.

### I. INTRODUCTION

As automotive enthusiasts, we are looking for ways to increase the power output of our motor. One of the first steps taken to achieve the same is by introducing inter coolant setup for the better performance in the air filter even though some companies now manufacture and offer high performance air filter. Almost all claim a power gain through increased air flow and some claim better filtration as well the expected results in the setup on air filtration provides a better breathing capacity to the engine compared to the normal air filtration process. The better breathing capacity over the entire life of filter using inter coolant setup ensures better throttle response and increases the fuel economy, etc.

### II. LITERATURE REVIEW

**8-9 October 2015, Marius Tomaa, Iordan Filerua:** This paper aims to investigate the technical state of air filters that equip Renault K9K engine that are being replaced during the preventive maintenance schedule according to manufacturer recommendation. The study refers to the measurement in laboratory conditions on a specialized rig of the restriction generated by the air filter housing, as well as the restriction generated by new and used air filters. The used filters were collected from vehicles that came to service stations for air filters replacement as part of the preventive maintenance schedule. The results are used to establish to what extent the air filters replaced during planned maintenance could still be used, if they were replaced too late or at the appropriate time.

**(ICETEST - 2015) Mathews V Johna, Sandhya M, Balakrishnan K:** This study addresses the issue of whether OEM air filter replacement with aftermarket air filter (oiled media filter from K&N) improves fuel economy. The increasing air filter pressure drop in diesel-engine-powered vehicles due to clogging was measured, with primary focus on changes in vehicle fuel economy but also including acceleration and engine temperature. The performance of both

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types of filters in new and clogged condition in terms of pressure drop, air discharge and filtering efficiency are also studied.

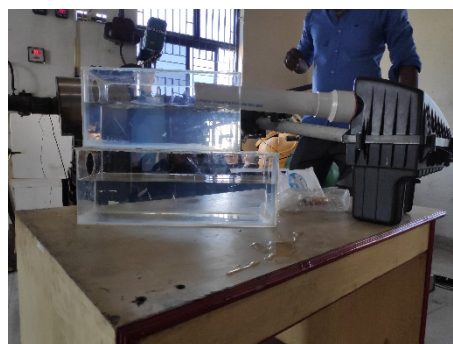
**XINGXING ZHANG on 26 September 2017:** This paper presents a comprehensive review on the synergistic effect of different air purification technologies, air filtration theory, materials and standards. It evaluated different air filtration technologies by considering factors such as air quality improvement, filtering performance, energy and economic behaviour, thermal comfort and acoustic impact.

### III. OBJECTIVE OF PROPOSED WORK

1. To reduce the dust particles settles on air filter.
2. To increase the filtering Efficiency of Diesel engine.
3. To increase the fuel economy.
4. To reduce the Emission in Diesel engine.

### IV. DESCRIPTION FAIR FILTERING SETUP

S.no	Components
1	Acrylic box
2	Reducer
3	Filter case
4	Air filter
5	Diesel Engine



Fig(5.1):Design of fabricated model

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## V. EXPERIMENTAL RESULT

### BRAKE POWER:

$$BP = 2\pi NT 60$$

ENGINE SPEED, N = 1000RPM

FOR DIESEL, TORQUE, T1 = 21.70 NM

BRAKE POWER, BP1 =  $(2 * \pi * 1000 * 21.70) / 60$

$$BP_1 = 2.270 \text{ kW}$$

### BRAKE THERMAL EFFICIENCY:

$$\text{BRAKE THERMAL EFFICIENCY} = (\text{Brakepower (kW)} * 100) / (\text{MassofFuelsupplied (mf)} * \text{Calorificvalue (Cv)})$$

CALORIFIC VALUE OF DIESEL, CV = 44.8 \* 10<sup>6</sup> J/KG

FOR DIESEL, BRAKE POWER, BP1 = 2.272 kW

MASS OF FUEL SUPPLIED, MF = 0.002557 KG/S

BRAKE THERMAL EFFICIENCY, BTE1 =  $2272 * 0.002557 * 44.8 * 10^6 * 100$

$$\text{BRAKE THERMAL EFFICIENCY, BTE1} = 1.98 \%$$

Filtering condition	Load Applied, L (%)	Torque, T (N-m)	Brake Power, BP (kW)	Mechanical Efficiency, ME (%)	Mass of Fuel supplied, m <sub>f</sub> (kg/s)	Brake Thermal Efficiency, BTE (%)
Diesel No filter	25	18.70	1.958	8.82	0.002657	1.64
	50	40.40	4.230	11.98	0.001889	4.99
	75	62.19	6.512	16.25	0.001662	8.25
	100	83.80	8.772	20.21	0.000857	22.85
Air filter	25	20.07	2.101	11.25	0.002643	1.77
	50	43.15	4.518	14.65	0.002396	4.20
	75	66.22	6.934	19.02	0.001919	8.06
	100	89.03	9.323	23.10	0.001254	16.59
Setup 1	25	20.37	2.133	11.83	0.002662	1.788
	50	43.75	4.587	14.23	0.002471	4.13
	75	66.12	7.028	19.92	0.001972	7.95
	100	90.50	9.477	23.25	0.001094	19.33
Setup 2	25	20.65	2.162	12.95	0.002476	1.94
	50	44.30	4.639	15.02	0.00197	5.25
	75	67.95	7.115	20.35	0.001446	10.98
	100	91.60	9.592	24.89	0.001233	17.36

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## VII. CONCLUSION

As automotive enthusiasts, we are looking for ways to increase the power output of our motor. One of the first steps taken to achieve the same is by introducing inter coolant setup for the better performance in the air filter even though some companies now manufacture and offer high performance air filter. Almost all claim a power gain through increased air flow and some claim better filtration as well the expected results in the setup on air filtration provides a better breathing capacity to the engine compared to the normal air filtration process. The better breathing capacity over the entire life of filter using inter coolant setup ensures better throttle response and increases the fuel economy, etc.

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