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Review Article

Simulation of HC Toxic and Inflamer through Outlet & Force on Cylinder with Temperature and the Relationship of Volume and Rotation in Engine of Vehicles

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Abstract

HC which is harmful to body is searched and find the 87mm is bigger than 75mm under certain time as the consuming of 7.6lit/h. With the increasing temperature the inflamer is high, the temperature is big. If 0.14ml/s or above is outlet interface, it is known to be how much it is. The biggest 250Kg of force will happen here when cylinder diameter is 70mm. The force will incline with the increasing temperature and diameter. The volume decreases when engine rotation increase with little 5.8lit/hr. The economic efficiency of the volume is the lowest in the first stage which attains 1/4~1/6 times emission.

Keywords: Toxic inflamer; simulation; HC; volume; Force; internal diameter; temperature; rotation; torque.

INTRODUCTION

The toxic fuel is harmful to human health and environment in earth, so that simulation is studied to find the relation of inflamer and time and temperature in Engine is significant. Among them HC is toxic inflamer who is harmful to our body, so it needs be studied to look for the internal relation in vehicles [1-3]. Through calculation the temperature of outlet in engine and force in cylinder is successful so we can simulate it through engine cylinder. Meantime the specified HC is studied to find the quantity of toxic fuel. The temperature may attain several hundred ℃ is studied in this paper details. In order to search these respects this paper is simulated and investigated. It are harmful after they are entry in our blood. It can result in many disease in our bodies. Meantime it has harm to environment too. To be benefit to us the minimum toxic gas may be produced with many vehicles. It is evaluated that one family has a vehicle ie. mainly car in every three families in China. So they are huge discharged gas specially No. two of HC. In this paper we discuss this toxic fuel detail to search their discharged gas quantity. We look for this minimum gas method for environment and health, which is destination.

The parameter of inflamer force is important at engine cylinder of vehicle. It is investigated that it is variable with temperature and cylinder length in last paper [2-4]. It has significant role in structure of engine inner cylinder simulation and practical parameters. It is to evaluate the inflamer quantity from cylinder which includes HC etc inflamer gas in whole in the end. It is convenient for us to control the inflamer and do the prediction and simulate status regardless of experimental measure. It must connect with these measure later to check its precision to be proven its correction. On the other hand it is investigated what the relationship between volume and rotation is. In future the relationship between the volume and pressure & torque etc can be proceeded either.

Modeling Toxic Fuel

According to gas principle formula

$$\mathrm{n}RdT = PdV \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

It has $dFV/s = nRdT$ …… (2)

so $V = nRdTS/dF$ …… (3)

And $dV = \dfrac{RdT\pi d^2}{15*4dxg}$ ……... (4)

According to (1)

$$F = nRdTS/dV \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Supposes $F = xmg$ ……..… (6)

It has $\frac{dF}{S\rho} = \frac{RdT}{15}$ ..... (7)

So $dF = \frac{RdTS\rho}{15*10^{-3}}$ ..... (8)

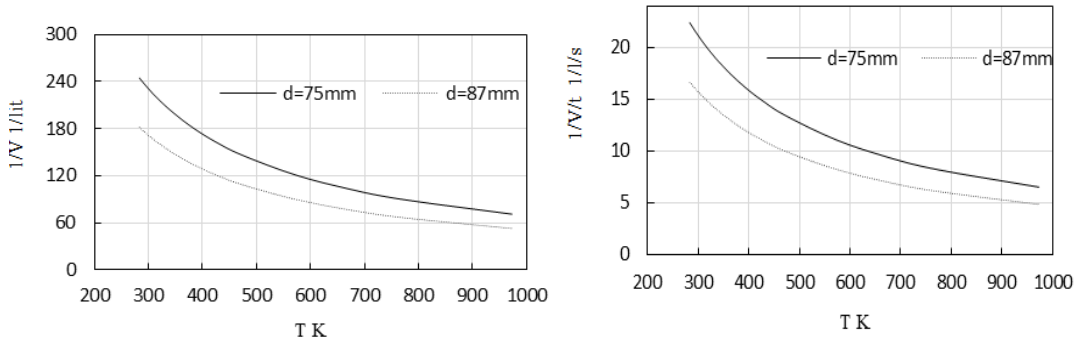
Since $T = 9.55P/n$ ..... (9)

So $dP = \frac{4nRdT}{\pi d^2 l}$ ..... (10)

Here, n is moles; T is temperature K; R is 8.3 J/(mol.K); F is force N; S is square of engine inner square, m^2 , $\pi d_0^{\ 2}/4$; d is engine internal diameter m; V is volume of gas in engine; ρ is atmosphere density 1.3Kg/m^3; n is rotation of engine, r/m; T is torque of engine, Nm.

DISCUSSION

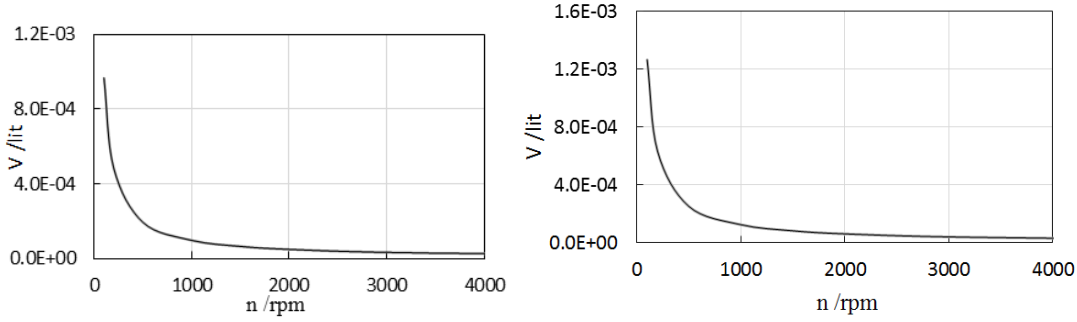
As in Figure 1 (a,b) HC is searched to the mass ratio with emitted 1% and find the HC is more than NOx under certain time with the consuming of 7.6lit/h. It is under 1% concentration of toxic fuel HC at the speed of 30Km/h in this figure. Meantime the more value of engine diameter contains the more emitted gas will be. In this figure the HC with the engine internal diameter being 87mm is more than its 75mm. The HC will incline when their concentration incline from 1% to 2%. With the increasing temperature the inflamer is high, the temperature being big since the speed is big too.



(a) V **(b) 1/V/s**

Fig-1: Curves of emitting HC V/s and time with HC 1% under 30Km/hr。

The research scope of temperature is from room temperature to 650ºC. Here it is found that the toxic fuel is increased with the increasing temperature. It is due to the high speed of vehicles. It expresses that the high temperature is attained here in this study. The course of outlet of fuel is necessary so the outlet in pipe is lower than here outlet interface. So the temperature in here is higher than 527ºC. As to the definite interface volume we know it can not be clarified. But if 0.14ml/s or above is interface with diameter of 75mm, it is known to be how much. In Figure 2(a, b) the toxic gas HC increases when temperature inclines at condition of 0.1% concentration. If the engine cylinder inner diameter is 75mm& 87mm the data is as Figure-2. Meantime the quantity is larger in 87mm than that in 7mm. As Figure 2(a, b) the toxic gas HC is emitted when vehicle speed is 30 Km/hr at condition of HC concentration.



(a) 5.8lit/hr **(b) 7.6lit/hr**

Fig-2: The relationship of volume and rotation with different consumption on engine cylinder

It is found from reference [2-5] that the cylinder volume is maximum so the times are from several hundreds to bigger one to compare with atmosphere. In this study it is proposed that it is emitting atmosphere whose volume is very much to compare the seal cylinder which is the biggest volume and temperature in cylinder. It is convenient to study in model to evaluate the emitting course from the biggest engine work end to inflamer through vent pipe because the measure is very difficult to adopt data. From Figure-

3 it is found that with increasing temperature the F will increase in atmosphere. With increasing diameter of cylinder it will increase too. The 250Kg of force will happen here when temperature is 627℃ when diameter is 70mm. The times of force in and on cylinder attains 1.6E5 at the cylinder. The higher diameter causes the higher force. The force turn is 80mm>70mm>60mm. So when we can choose the big temperature and diameter of cylinder shall be right.

In Figure 4(a) the volume decreases when engine rotation increase with 5lit/hr. The volume of slow rotation declines steeply until 500r/m and then it decreases sluggishly. In the end it maintains a line. The economic efficiency is the lowest in the first stage which attains 1/4~1/6 times emission in these liters. In Figure 4(b) the similar trend happens as above mention. Moreover the one of 7lit/hr is bigger than 5lit/hr which arrives 20%. Since the principle of PV=nRT if temperature increases a certain pressure will increase too under a certain change V. So because the cylinder is small change seal vessel that it is to promote a certain temperature will result in force inclining. Due to pressure difference one outside cylinder will be neglected by large pressure difference the force will become big so that it can drive the vehicle through two tires. The maximum force outside cylinder will judge whether the inner force in engine cylinder is to be. Pressure difference will promote the inner gas with high temperature to emit out so as to guarantee the circle of out continuously and form large pressure for driving a load vehicle.

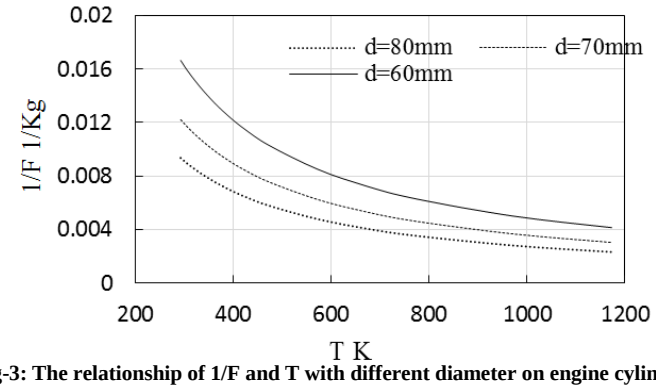


Fig-3: The relationship of 1/F and T with different diameter on engine cylinder

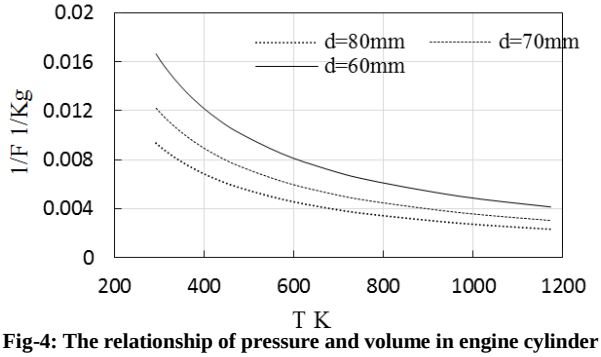


Fig-4: The relationship of pressure and volume in engine cylinder

The relationship between pressure and volume is expressed as pressure will decline when volume increases which explains well the theory principle. Moreover at initiate the pressure declines steeply from 5E6Pa to 2E6Pa when volume attains 0.5E-3liters. The maximum pressure after ignition place is 2E6Pa. It is observed that it can be bigger on 7.6 liters than 5.8 liters. The difference between them maintains 0.5E6Pa after stable status. Here -30ºC is adopted as to vehicle in winter. As we knew the outlet pipe is very long so the gas temperature will decline from cylinder exit to external outlet. We look forwards to investigate the temperature change through it. Whether does it correspond to theoretical speculation.

CONCLUSIONS

HC with the engine internal diameter being 87mm is more than its 75mm with 7.6 lit/hr. With the increasing temperature the inflamer is high, the temperature is big since the force is big too. If 0.14ml/s or above is outlet interface, it is known to be how much it is. It is found that the 250Kg of force will happen here when temperature is 627°C when diameter is 70mm. Moreover the one of 7.6lit/hr is bigger than 5.8lit/hr. The force turn is 80mm>70mm>60mm. So when we choose the big power the bigger diameter cylinder shall be chosen. The volume decreases when engine rotation increase with small 5.8lit/h. The

economic efficiency of the volume is the lowest in the first stage which attains 1/4~1/6 times emission.

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