

Inspection and Rectifying Air Lock in Fuel Pump (Inline Type)

MANO. R., RAMESH.T

Abstract- Now-a-days, it is a common problem that occurs in the fuel injection pump is “Air lock or Diesel block”. It is difficult criteria to find out where the air lock occurs in the vehicle. This air lock can cause blockage in the nozzle holes (incase of partly blocked nozzle, the angle of spray of nozzle would be differed. For example: if the angle of spray is 30 degree it is varied to 45 degree). If the angle of spray of nozzle differs fuel does not burn completely. It also causes starting trouble in the vehicle. The choking of the diesel strainer also occurs due this air lock. There is an easy methodology to identify and overcome the air lock problems. This paper explains how the air lock occurs in the fuel injection pump and how to identify the air lock and rectify it.

Keywords:- Air Lock, Fuel Pump, Strainer.

I. INTRODUCTION

A. FUEL LINE

The diesel in the fuel tank flows from tank through the suction line to the pre filter. The suction line is a tube made up of synthetic rubber. From the pre filter, the diesel flows to the water separator. It separates the water molecules and sediments (impurities) present in the diesel. Now the filtered diesel reaches the feed pump inlet. It then reaches the fuel injection pump main gallery through feed pump outlet. Feed pump is actuated by fuel injection pump cam shaft. The diesel goes to the delivery valve depending upon the number of cylinders of the engine. From the delivery valve, the pressurised diesel goes to the nozzle inlet holder. The nozzle sprays the diesel into the engine's cylinder (Assume that one drop of diesel is converted into 10000 atoms of diesel). The nozzle pressure is around 16 kgf/cm square. In this process, the surplus diesel from the fuel injection pump is return back to the fuel tank through diesel return line.

II. CLASSIFICATION OF FUEL LINE

The fuel line is classified into 3 lines,

- SUCTION LINE(it starts from diesel tank main tube to feed pump inlet)
- DELIVERY LINE(it starts from feed pump outlet to the fuel injection pump main gallery).
- HIGH PRESSURE LINE (it starts from fuel injection pump delivery holder to the nozzle inlet holder, also it is made up of metal tube to withstand the high pressure)

III. SYMPTOMS OF AIR LOCK

- Stalling and hard starting.
- Misfiring and rough running.
- Poor acceleration and hesitation.
- While vehicle running in highway, speed gradually reduces and engine turns off.

IV. IDENTIFICATION AND RECTIFICATION

The air lock occurs in the suction line only. The possibilities of the air lock are due to choking of the strainer because of the dust particles and due to leakage in the suction line because it is made up of synthetic rubber and due to suction line cracks which is developed due to loose clamping(while it looses the suction tube rubs with chassis frame). The foremost effect of the air lock is the vehicle won't start, as the engine cranks but the fuel does not supply to the engine. As this problem occurs it is caused by the air lock in the suction line. Once the problem is identified that it is due to strainer choke, clean the strainer and loose the water separator banjo bolt and using the feed pump apply load manually so that the air in the suction line will be removed. If the air lock is due to the leakage in the suction line, then change the suction tube and repeat the same process as discussed above. And in another condition, when the diesel tank is empty for long time this problem will occur. For doing the above said procedure, there must be atleast one fourth of diesel should be present in the tank.

V. EFFECTS OF AIR LOCK

- High outside ambient temperatures.
- Extreme engine operating temperatures.
- Fuel lines routed too close to the exhaust system and other hot components.
- Running a winter fuel blend during warm weather
- Driving at a high altitude.

VI. CONCLUSION

To avoid this critical problem, periodical cleaning of impurities and sediments (draining the fuel and blow the air in the suction line and fuel tank strainer) should be done . Also maintain a recommended level of diesel given in the vehicle's manual. By following this methods, the efficiency of the engine increases and also the mileage of the engine increases. This also causes low level of emission as the fuel burns completely. It is eco friendly as by rectifying this problem, it reduces the global warming.

REFERENCES

- [1.] APICAL VAPOUR LOCK EFFECT - PHENOMENON RELATED TO ENDODONTIC IRRIGATION - A REVIEW Pradnya V. Bansode and Vidya M. Patil.
- [2.] A review of vapour lock issues during motor gasoline or automotive gasoline usage in piston engine aircraft- K Thanikasalam, Rahmat Mohsin, A G zmohammad Fahmi, Mirza Zulkifli.

- [3.] MacCoul, N. and Barber, E., "Vapor-Lock Traits of Cars and Their Limitations on Gasoline Volatility," SAE Technical Paper 350101, 1935.
- [4.] A Textbook of Automobile Engineering by R. K. Rajput.
- [5.] Automobile Engineering by Dr. Kirpal Singh.