

User Prospective On Gasoline Fuel Specifications

Dr. D.S.Khatri
Engineering Division
Maruti Udyog Ltd.

Challenges

- Stringent emission regulation
 - BS 3, BS4,..... ZERO emission
- Lower fuel consumption
- High performance
- Improved durability

Need

- To meet the ever-increasing demand there exist a need:
 - To upgrade the engine technology
 - To upgrade the fuel quality/spec. to match the engine technology

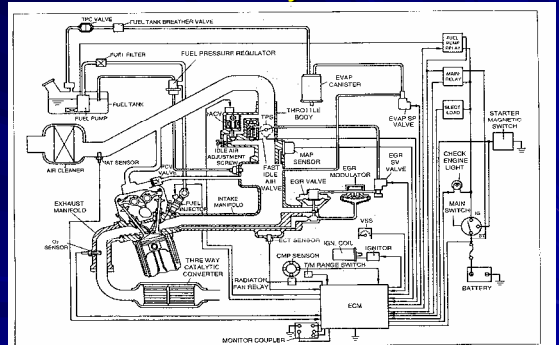
Fundamental Requirements of a Gasoline Engine

- Air
- Fuel
- Mixture preparation
- Ignition source

Emerging Gasoline Engine Technology

- Mixture preparation :
 - Carburetor MPFI system
- Ignition System :
 - Conventional Electronic Ignition
- Exhaust Gas After Treatment:
 - Open loop Close loop
- EGR
- Maniverter

MPFI System



New Engine Technology Demands

- Improved fuel specification
- Better market fuel quality

Problem Faced Due to Lower Fuel spec./Quality

- Fuel pump failure
- Fuel injector clogging
- Abnormal bore wear
- Intake valve deposits
- Oxygen sensor poisoning
- Engine Knocking

Fuel Pump Failure

- Armature burnt
 - Bearing sulphuration problem
- more than 100 cases.
- Cause:- More "S"

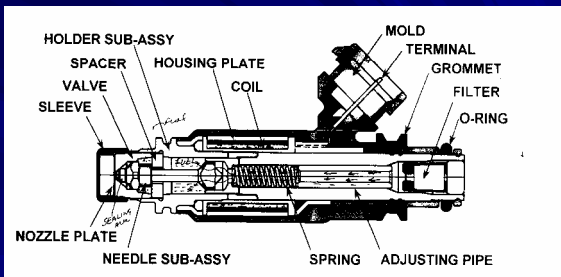


Fuel Pump Failure - Continue

- Fuel Pump not working
 - Choke coil erosion
- More than 1700 cases
- Cause:-Acidic nature of fuel



Fuel Injector



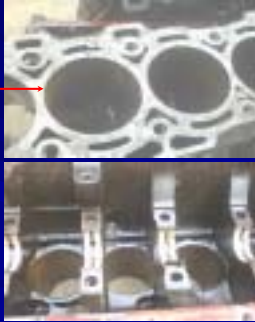
Fuel Injector Failure

- Problem reported:- Poor pickup, engine misfiring.
- Injector fuel flow rate low.
- Brown deposit at injector tip.
- Rusted needle.
- Cause:- H₂O, "S"



Abnormal Engine Bore Wear

- Problem reported:- high fuel/oil consumption.
- More cylinder bore wear.
- cases reported 1432.
- (935 from north)
- Cause:-Gasoline sample have 4.36% chloride(20ppm spec), 0.059 mg KOH/gm(0.002 spec)



Intake Valve Deposits

- Problem reported:- Poor pickup, High FC, difficult to start, engine seizure.
- Deposits on intake valve observed.
- It results in poor sealing, seizure of valves
- Cause:- More "Gum"



Problems with Oxygen Sensor

- Problem:- Erratic output of oxygen sensor
- Cause:- Pb deposit on the tip of the sensor
- Solution: Lower "Pb" in fuel

Engine Knocking

- For better power, fuel efficiency and lower CO₂ emissions, current engine are designed with high CR
- This demand high Octane no. gasoline.
- Any variation in RON/MON(due to adulteration) results in knocking

Failure summary

Problem	Cause
FP coil corrosion	Acidic nature of fuel
FP bearing Sulphuration	More "S" in fuel.
Injector clogging	More "S", gum
Abnormal Bore Wear	More Chloride & KOH
Rust Problems	Traces of H ₂ O
Intake valve deposits	More Gum
O ₂ sensor poisoning	Pb in fuel
More vapor formation & wear.	Addition of ethanol

Improvements desired in Gasoline fuel quality

- Lead free
- Lower sulfur
- Lower gum level
- Lower phosphorus level
- Increase Octane number
- Improved copper corrosion properties

&

Unadulterated Fuel