



1. Air Intake System Checks

- Air cleaner element holed or not sealing correctly
- Incorrect size air cleaner element for type of housing
- Cracked or distorted air cleaner element housing
- Restriction gauge adapter broken
- Inlet or induction system from air cleaner to engine damaged
- Leak in vacuum piping
- Leak in air feed to compressor
- Inlet manifold gasket leaking or cracked
- Injector seat leaking (petrol engines)
- Damaged or missing breather
- Damaged or missing dip-stick seal
- Faulty or missing oil filler cap
- Faulty or missing crankcase ventilation
- Oil storage or top-up containers and funnels dirty

2. Cooling System Checks

- Faulty thermostats, radiator shutters or shutterstats
- Radiator fins or cores blocked or clogged
- Defective water pump
- Coolant level low
- Radiator pressure relief cap defective
- Fan belt loose
- Faulty thermostatic fan
- Engine overloaded (lugging)
- Cooling fins clogged or defective (air cooled engines)
- Engine caked with dirt
- Defective water hoses
- Pressurise system and check for leaks
- Check sampling technique, was sample taken cold?
- Oil cooler passages blocked or restricted
- Air entrained in cooling system
- Insufficient coolant capacity
- Incorrect air/fuel ratio or timing (gas and petrol engines)
- Incorrect coolant mixture
- Incompatible coolant mixture

3. Fuel Dilution Checks

- Sampling technique (sample pump washed out with fuel or solvent)
- Leaking fuel inlet and return pipes, pump seals and unions
- Faulty lift / transfer pump
- Worn or faulty injectors (eg incorrect spray pattern or break out pressure)
- Extended idling periods
- Faulty internal injector seals or O-rings
- Fuel leaks – pressure test system
- Incorrect thermostat fitted
- Extended periods under low engine load
- Pump calibration or timing incorrect
- Restricted fuel return lines
- Contaminated fuel
- Faulty engine protection system
- Low operating temperature

4. Bottom End Wear Checks

- Check filter for abnormal wear particles
- Abnormal noise on start up
- Check for low oil level
- Check oil pressure profile
- Check for faulty oil pump, oil pick up and pressure relief valve
- Overheating
- Coarse dirt entry
- Check for cause of fuel dilution
- Incorrect oil grade used

5. Top End Wear Checks

- High blow-by and crankcase pressure
- Low compression
- Lack of power
- Dirt entry in air intake system
- Abnormal noise
- Piston torching caused by defective injector spray pattern and timing

6. Incomplete Combustion (Sludge) Checks

- Restricted air intake system
- Restricted exhaust system (damaged exhaust pipe or silencer)
- Fuel system malfunction (timing and faulty injectors)
- Faulty turbocharger operation or pressures
- Check for low compression and excessive blow-by
- Extended oil and filter change periods
- Excessive exhaust back pressure (exhaust brake malfunction)
- Low engine operating temperature
- After-cooler or inter-cooler malfunction
- Dirty oil or filter by-pass valve defective
- Extended idling periods
- Faulty altitude compensation device
- Dirty or contaminated / adulterated fuel
- Faulty thermostat or radiator shutters (incorrect operating temperature)
- Faulty or incorrect engine brake operation
- Incorrect thermostat fitted

7. Water or Internal Coolant Leak Checks

- Pressure test cooling system to locate leak
- Pressure test with sump removed to locate leak
- Release pressure with sump removed to locate leak
- Blown cylinder head gasket
- Defective cylinder head seals
- Leaking sleeve seals
- Leaking oil cooler
- Cylinder liner cracked or holed
- Injector cooling seals leaking
- Engine breather blocked, missing or damaged
- Low engine operating temperature
- Extended idling periods

