Piston damage and causes

Piston crown damage

Seizure due to overheating (mainly piston crown)
- Overheating due to combustion defaults
- Incorrect valve timing
- Installation of incorrect pistons
- Malfunctions in the cooling system
- Clearance restriction in the upper sliding surface area

Impact marks
- Piston protrusion too great
- Incorrect valve recess
- Incorrect cylinder head gasket
- Carbon deposits on the piston crown
- Insufficient valve clearance
- Insufficient valve clearance caused by incorrect adjustment or a slipped toothed belt

Fused/melted off material
- Fault during mixture formation
- Incorrect quantity of injected fuel
- Incorrect injection point
- Insufficient compression pressure
- Oscillating injection lines

Cracks in the crown and crown bowl
- Faulty or incorrect injection nozzle
- Incorrect injection point
- Incorrect quantity of injected fuel
- Insufficient compression pressure
- Lack of piston cooling
- Installation of piston with incorrect bowl shape
- Improvement in performance (e.g., chip tuning)

Piston ring damage

Material washout in the ring area
- Incorrectly installed pistons
- Fuel flooding
- Severe axial wear of the ring groove and piston rings
- Ring failure

Radial wear due to fuel flooding
- Fault during mixture formation
- Combustion defaults
- Insufficient compression pressure
- Incorrect piston protrusion dimension

Axial wear due to ingress of dirt
- Incorrect intake manifold mounting
- Dirt particles that are not completely removed during reconditioning
- Abrasive particles caused when the engine is being run in

Piston skirt damage

Asymmetrical piston wear pattern
- Bent/buckled connecting rod
- Incorrect quantity of injected fuel
- Correct injection point
- Insufficient compression pressure
- Insufficient valve clearance

45° seizure
- Excessively narrow fit of the piston pin
- Seizure in connecting rod eye
- Excessive eccentricity caused by incorrect adjustment or a slipped toothed belt

Dry running/fuel damage
- Over-rich engine running
- Combustion defaults (misfiring)
- Insufficient compression pressure
- Defective oil-entrained
- Oil dilution with fuel

Cylinder liner damage

Cavitation
- Poor/inaccurate seating of the cylinder liner
- Use of unsuitable coolant agent
- Use of unsuitable coolant agent
- Operating temperature too low/too high
- Restricted coolant flow

Bright spots in the upper cylinder area
- Carbon deposits on the piston ring land due to:
  - Excessive ingress of blow-by gases with oil entering the intake air system
  - Insufficient separation of oil and blow-by gases
  - Frequent idling or short-distance drives