MOTORSERVICE
RHEINMETALL AUTOMOTIVE

Piston damage and causes

Piston crown damage

Seizure due to overheating (mainly piston crown)

- Overheating due to combustion defaults
- Bent/blocked oil injection jet
- Installation of incorrect pistons
- Malfunctions in the cooling system
- Clearance restriction in the upper sliding surface area

Impact marks

- Piston protrusion too great
- Excessive remachining of the cylinder head sealing surface
- Incorrect valve recess
- Incorrect cylinder head gasket
- Carbon deposits on the piston crown
- Insufficient valve clearance
- Incorrect valve timing caused by incorrect adjustment or a slipped toothed belt

Fused/melted off material

- Faulty injection nozzles
- Incorrect quantity of injected fuel
- Incorrect injection point
- Insufficient compression
- Ignition delay
- 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
- Lack of piston cooling
- Installation of pistons with incorrect bowl shape
- Improvement in performance (e.g. chip tuning)

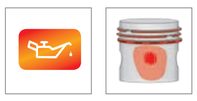
Piston ring damage

Material washout in the ring area

- Incorrectly installed pistons
- Fuel flooding
- Severe axial wear of the ring groove and piston rings
- Ring flutter

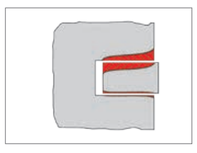
Radial wear due to fuel flooding

- Fault during mixture formation
- Combustion defaults
- Insufficient compression pressure
- Incorrect piston protrusion dimension



Axial wear due to ingress of dirt

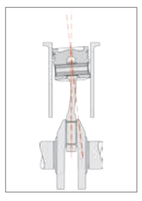
- Abrasive dirt particles due to inadequate filtration
- Dirt particles that are not completely removed during reconditioning of the engine (chips, blasting agent)
- Abraded particles caused when the engine is being run in



Piston skirt damage

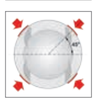
Asymmetrical piston wear pattern

- Bent/twisted connecting rod
- Connecting rod eyes bored at an angle
- Cylinder bore not straight
- Individual cylinders not installed straight
- Excessive connecting rod bearing clearance



45° seizure

- Excessively narrow fit of the piston pin
- Seizure in connecting rod eye (inadequate lubrication at initial start-up)
- Incorrectly installed shrink-fit connecting rod



Dry running/Fuel damage

- Over-rich engine running
- Combustion defaults (misfiring)
- Insufficient compression
- Defective cold-start device
- Oil dilution with fuel

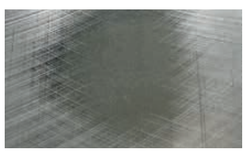
Cylinder liner damage

Cavitation

- Poor/inaccurate seating of the cylinder liner
- Use of incorrect O-ring seals
- Use of unsuitable coolant agent
- Insufficient prepressure in the cooling system
- Operating temperature too low/too high
- Restricted coolant flow

Bright spots in the upper cylinder area

Carbon deposits on the piston top land due to:
- Excessive ingress of oil into the combustion chamber due to defective components
- Increased emissions of blow-by gases with oil entering the intake air system
- Insufficient separation of oil vapour from the blow-by gases
- Frequent idling or short-distance drives



Further details on this subject can be found in our brochure "Piston damage – recognising and rectifying".
Or ask your local Motorservice partner.
We have also provided a lot more information for you at www.ms-motorservice.com and on our Technipedia at www.technipedia.info.

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