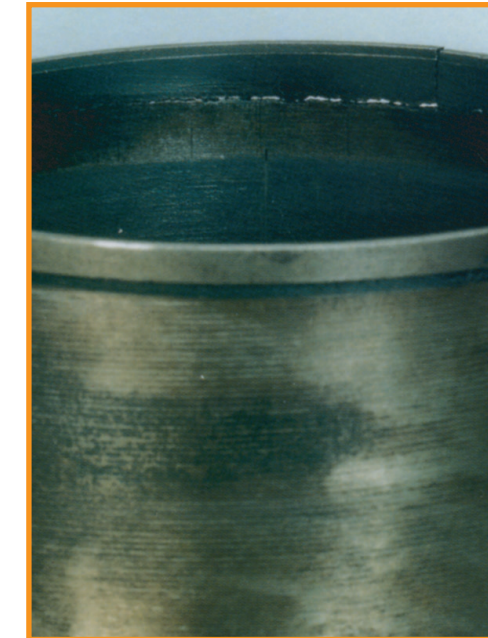


**Piston seizure, with severe damage to the top land**



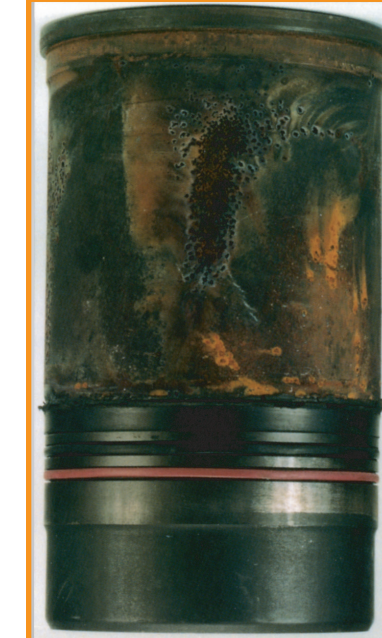
**Symptom:** Loss of power. Engine noise. Fumes from the engine breather.  
**Cause:** Exceptionally high combustion temperature. Malfunction of piston oil cooling jets (in engine incorporating this equipment.) These cause seizure close to the piston crown, which may result in piston ring damage and progression of seizure down the piston skirt.  
**Remedy:** Check adjustment of fuel injection equipment and correct as necessary. Rectify or replace damaged cylinder components. Ensure any piston under crown cooling jets are functioning correctly.

**Fracture of cylinder liner in the under flange area**



**Symptom:** Combustion gases ventilating to coolant, Engine noise, Eventual destruction of liner.  
**Cause:** Incorrect distribution of pressures on liner flange as may be caused by: Cylinder block distortion. Incorrect tightening of cylinder head studs. Misaligned block counter bore. Foreign material assembled under flange. Incorrect location of cylinder head gaskets. Incorrect liner assembly procedures. Incorrect or non-approved gasket. Incorrect reworking of the flange seat, if applicable.  
**Remedy:** Establish cause and take corrective action. Replace cylinder liner and any other affected components.

**Pitting and erosion of liner outer surface**



**Symptom:** Loss of coolant.  
**Cause:** Incorrect piston to liner clearance, poor seating of the liner in the bore, use of unsuitable coolants, engine operating temp too low.  
**Remedy:** Clean and check sealing ring grooves and contact areas. Replace cylinder liner. Ensure that the coolant system is operating at the correct pressure. Use coolant inhibitors as recommended by the engine manufacturer.

**Erosion of piston skirt adjacent to piston pin hole. Damage to cylinder bore**



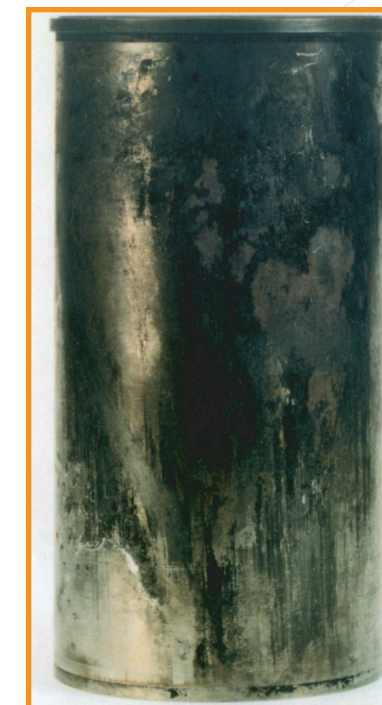
**Symptom:** Engine noise. Oil consumption.  
**Cause:** Incorrect assembly of circlip. Fitting of used circlips. End pressure transmitted via the piston pin, possibly associated with connecting rod misalignment, tapered crank journals, or excessive crankshaft end float. Foreign material assembled in piston pin bore.  
**Remedy:** Correct any cylinder bore damage. Check for and correct any connecting rod or small end bush misalignment. Check for and correct any crankshaft end float. Replace piston assembly, ensuring that the circlips are correctly located.

**Piston seizure, with severe damage concentrated in the lower area of piston skirt**



**Symptom:** Loss of power. Engine noise. Fumes from engine breather.  
**Cause:** Use of unsuitable liner sealing ring, use of additional sealant with liner sealing ring, leftover debris from old oil seals in the grooves.  
**Remedy:** Inspect cylinder bores and coolant circulation. Correct as necessary. Replace damaged cylinder components.

**Cylinder liner bore distortion. Scuffing or seizure of piston and piston rings. Carbon deposits on outside of cylinder liner**



**Symptom:** Loss of power. Oil consumption. Fumes from engine breather. Piston seizure in extreme cases.  
**Cause:** Cylinder block distortion. Cylinder head distortion. Damaged or incorrectly fitted cylinder head gasket. Incorrect liner fitting.  
**Remedy:** Thoroughly clean the engine block bores. Check for block bore distortion and rectify if possible.

**Cracks radiating from the combustion bowl**



**Symptom:** Cannot be detected during normal engine operation.  
**Cause:** High temps due to faulty cooling system, excessive engine brake use, insufficient piston cooling, use of pistons with incorrect specifications.  
**Remedy:** Replace damaged components.

**Piston ring scuffing, or localised areas of piston ring seizure**



**Symptom:** Oil consumption, with possible fumes from engine breather.  
**Cause:** Excessive cylinder surface temperature. Marginal lubrication, particularly during early engine life. Cylinder bore distortion.  
**Remedy:** Rectify any cylinder bore damage. Replace piston rings, also the piston, if necessary. Ensure the complete engine lubrication system is fully primed (oil pump, filter, etc.) Observe running in procedures as recommended by the engine manufacturer.

**Piston ring land fracture**



**Symptom:** Loss of power. Oil consumption. Emission of fumes from engine breather.  
**Cause:** Leaking injectors or injectors with poor atomization. Compression pressure too low due to incorrect head gasket, leaking valves, or worn piston rings. Improper or excessive use of starting aids like aerosols.  
**Remedy:** Establish cause and take remedial action. Replace piston assembly. Prevent engine overspeed. Change oil and oil filter.

**Erosion and burning of piston crown**



**Symptom:** Loss of power, emission of fumes from engine breather. Exhaust smoke.  
**Cause:** Incorrect fuel injection, injection timing, over fuelling, damaged or incorrectly located injector.  
**Remedy:** Inspect and correct fuel injection equipment and timing. Check and correct any damage to cylinder bore. Replace piston.

