Notice:

- These slides are part of a larger programme.
- Online information does not imply that a person is capable of performing any diagnosis or repair.
- These slides are merely a reference tool.
- These slides are not a substitute for completing a dedicated factory approved training programme.
- For a list of approved training locations, please go to www.rotaxflyingclub.com.

Presentation Overview

Piston Design & Analysis

Engine type:
ROTAX® 2 STROKE

System:
72-10-00

Audience:
Maintenance (line)

Education level:
Service

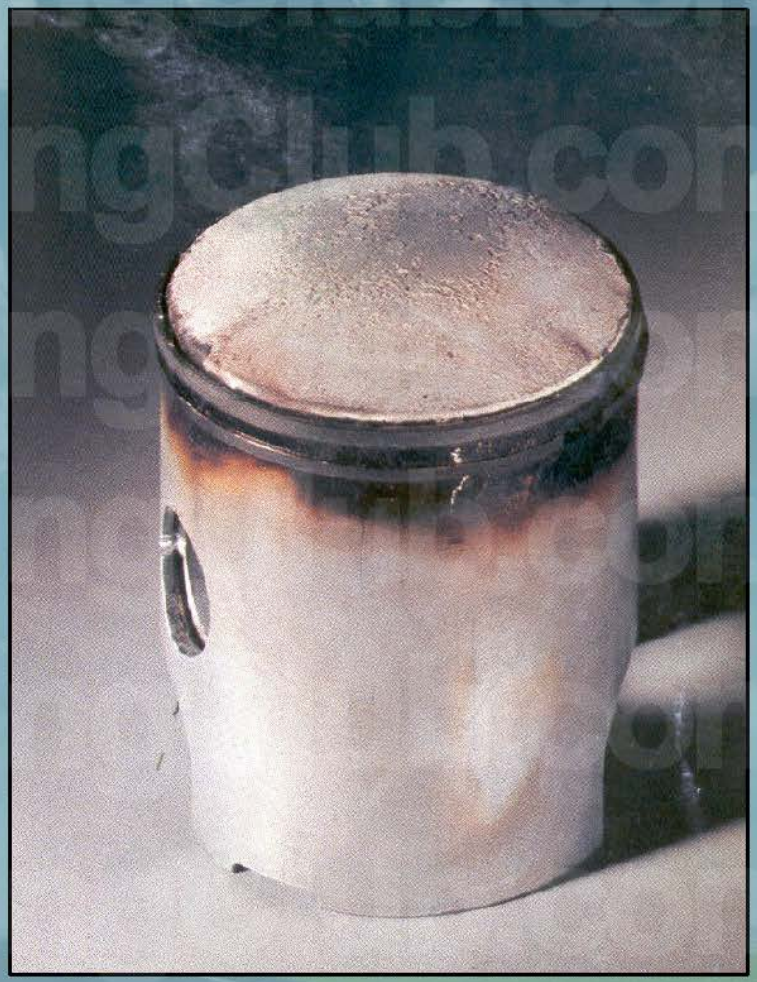
Language:
English

Reference Materials:
OH;MM;RM; SI;SB;SL

Instructor:
Eric Tucker - RFSC 0001

Normal Pistons

- Deposits vary from oil ash, brown, tan, to black/brown. Light color denotes higher cylinder temperatures.
- Light scoring is normal, varnish from blow-by gas is normal



Heat Seizure

- Excessive heat, over 1200F/650C EGT
- Lean jetting or adjustments on carb
- Incorrect loading on propeller allowing excessive RPM

Cold Seizure

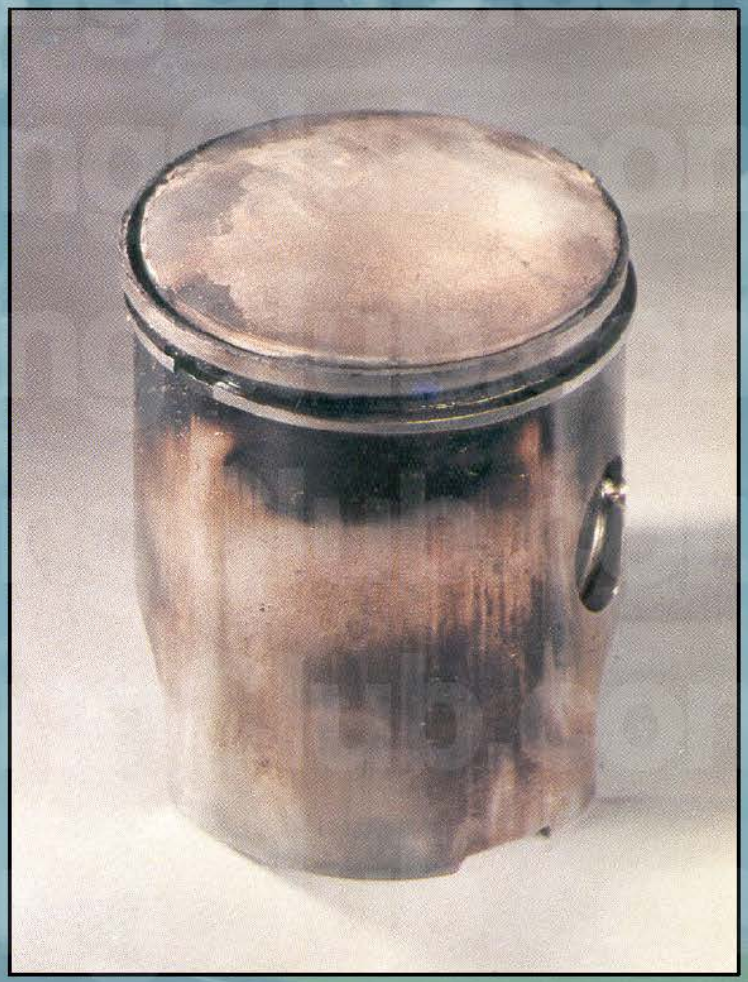
- Thermo-imbalance of piston and cylinder
- Lack of warm-up
- Excessive temperature difference inlet to outlet on engine.

Lack of Lubrication

- Excessive water ingestion causing loss of oil film on intake.
- Lack of intake air filter service.
- Results in excessive clearance

Oil Failure / Oil Flash

- High temp in engine from cooling system failure, fan belt, coolant problems.
- Poor quality oils, auto, gear, unsuitable temperature stability.



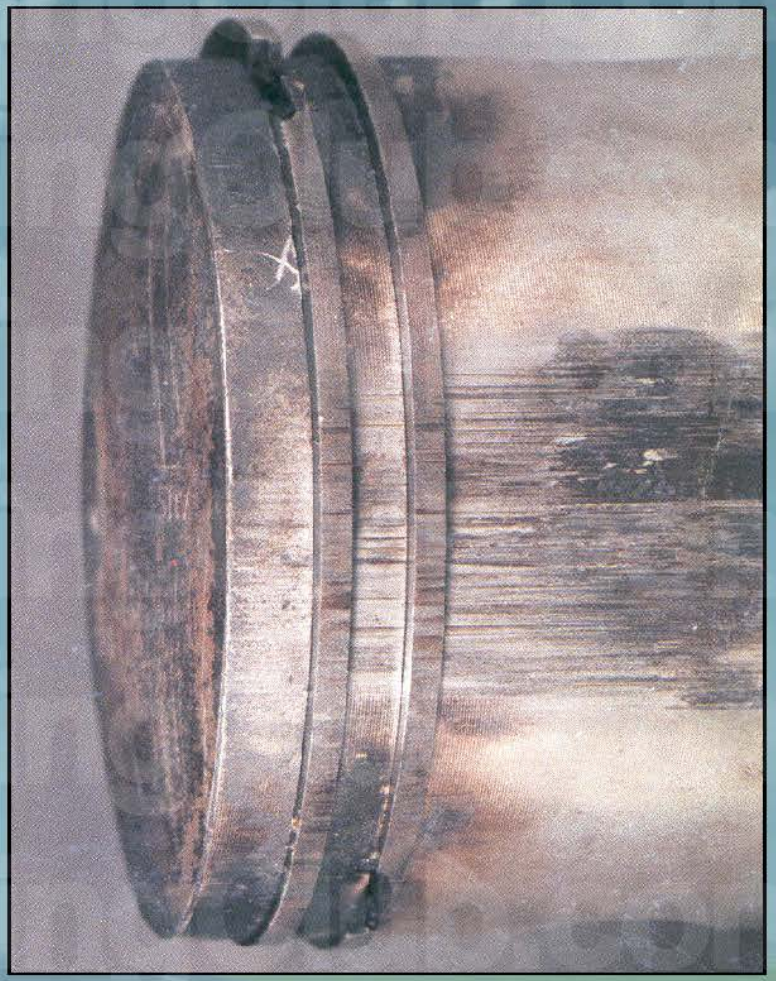
Lubrication Conflict

ROTAX AIRCRAFT ENGINES

- Mixing of oils
- Synthetic/Mineral
- Chemical reaction
  - May stick rings/bearings

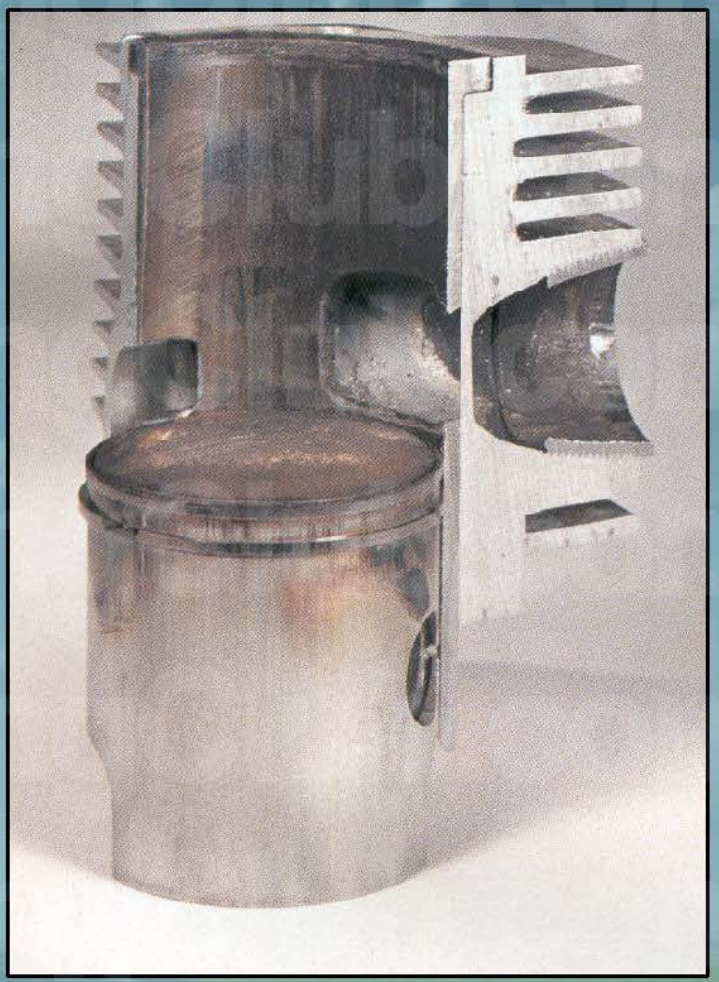
Piston Scuffing

- Scuffing on exhaust side with no marks corresponding on intake.
- Thermal loading of oil film due to poor quality oil.



Piston Ring/Cylinder Scuffing

- Oil breakdown due to:
  - Improper break-in
  - Poor quality oil
  - Lack of oil in mixture
  - Excessive loading of engine (propeller pitch)



Piston Dome Breakout

- Ignition timing failure, erratic firing.
- Lack of ignition damper, points engines.

Piston Dome Detonation

- Pre-ignition, leading into detonation
- Advanced ignition timing
- Spark plug heat range too high
- Low octane fuel

Foreign Material

- Material damage on piston from displaced or introduced object.
- Disassembly required of entire engine to find any additional material/damage and locate source.

Piston Scoring / Material Damage

- Objects between piston and wall.
- Complete disassembly required to find source and all related material

Piston Fracture

- Complete disassembly required to remove all material
- Cause from excessive wear, excessive RPM with no load, excessive clearance fitting.

Multi Failure

NOTES:

Carbon deposits found within damaged areas of piston, engine has run after a previous failure.

When this occurs piston shape and function is compromised,

Failure threshold levels are reduced and the temperatures the engine can normally operate at are no longer valid.

Sympathetic Seizure Marks

Piston exhaust side (hot side)

Piston intake side (cold side)

Pistons create sympathetic seizure, opposite side of initial failure, due to the floating nature of the piston within the cylinder. Inspection from the exhaust port can often see damage opposite the original damage area.