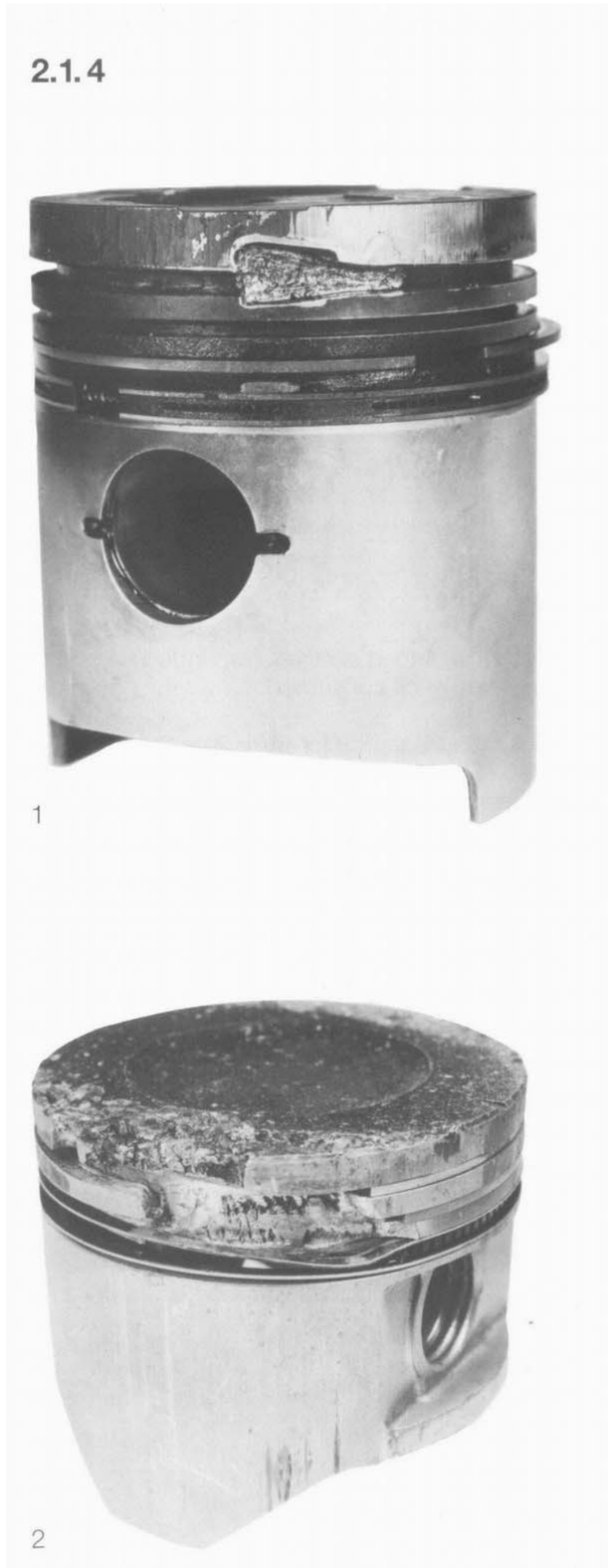

2 Ring Belt

2.1.4 Ring belt damaged by broken piston rings

Symptoms

The ring lands or top land in Figure 1 are "scoured", i.e. beaten out to a trough-shape. The surfaces of the scourings have been ground clean and smooth. The ring in the scoured groove is broken. The groove edges are beaded outwards and have been abraded by hard bearing on the cylinder, with the result that they are sharp-edged.

Figure 2 also exhibits polished fracture sections. After a longer running time, however, the top land also broke through and the detached parts were beaten into the section between piston and cylinder head.

Cause and Effect

The scourings are caused by broken rings. The ring breakage may be the consequence of faulty installation, inadequate closed ring gap or "ring flutter". This ring "flutter" is caused by the inertia forces during the movement of the piston if the engine is operated at excessive speeds or if the axial' clearance of the rings increases because of wear on the groove or ring sides. This often causes the rings to break into small pieces which then pound out the groove because of the inertia forces involved or as shown in Figure 2 even break the top land through. Due to the fragments which reached the combustion cavity substantial engine damage can result as a consequence.
Particularly in the case of two-stroke pistons where ring rotation is prevented by stops, this pounding often takes place near the stops. The cause of this is broken ring ends. This occurs when the ends of rings with inadequate closed gap, or with butting ends, are forced against the stop, or when the ring ends are cracked during installation. Groove wear is increased by overheating of the ring belt, since the hot combustion gases are able to blow past the broken rings or scourings which have been brought about already. This results firstly in increased wear on the overheated piston, caused by the reduced material strength, and secondly in a danger of piston seizure, since the lubricating film is burnt away.

Remedy

Exercise great care during assembly (use a piston ring clamp, and do not knock the rings in). In cases of doubt, check the closed gap of the ring,and, particularly where stops are used, check that there is some clearance at the ring ends.

In the case of two-stroke engines with single cylinders do not turn the cylinder during installation since the notched ring ends may break if they are pressed against the stops or the edges of a port. Remove burrs from the port edges. Before exchanging the rings measure groove wear or side clearance to avoid ring flutter caused by too big a clearance.