Service Engineering Bulletin

AUSTRALIA engine TECHNICAL

SB002

Prevention of Piston Ring Land Fractures

Before fractures can be prevented, we must understand the causes. Piston ring lands may be fractured by an upward force, or a downward force. Fracture faces are seldom vertical. Usually the angle of the fracture line will indicate the direction of the force which caused the fracture, and armed with this information you are more likely to identify why the fracture occurred. Ring land fracture faces usually form a "V" shape or an inverted V "^". If we think of the V as a wedge and if the wedge was driven in, the fracture faces would be forced closer together and would not separate. The force which caused the fracture must have forced the wedge out and must have come from the direction of the apex of the "V".

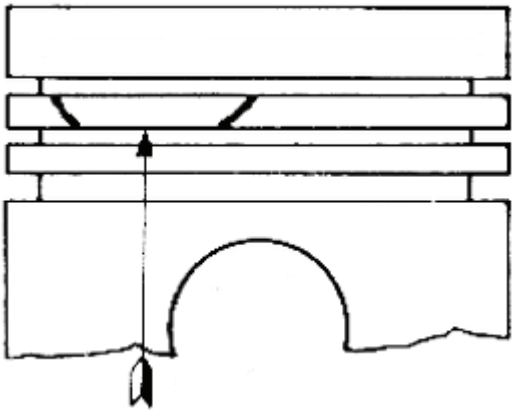

Figure 1

If the cracks or fracture lines are "V" shaped as in fig. 1, the damaging force must have come from the direction of the piston open end. The natural forces exerted on a piston from this direction are relatively small and could not cause land fracture. The most probable cause of this type of fracture would be an assembly problem which could cause the rings to contact the top of the cylinder. The extra pressure needed to try and push the piston into its cylinder would force the rings upwards on the piston and crack the lands. Piston ring gaps which foul cylinder ports in two stroke engines can also cause this type of damage.

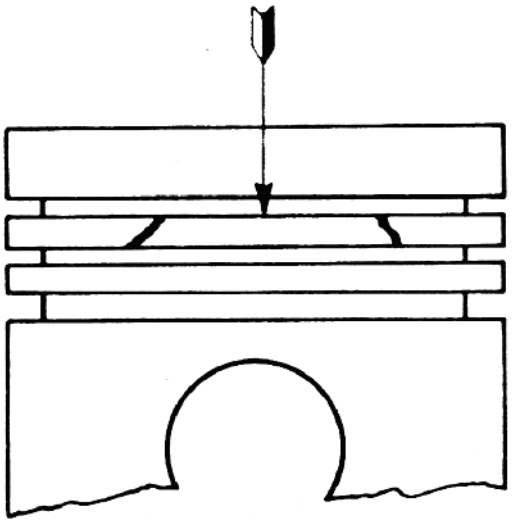

Figure 2

Cracks which form an inverted V "^" as shown in fig. 2 indicate that the damaging force came from the crown end of the piston, some form of overload being the most common cause. Too high a compression ratio, over advanced ignition, pre-ignition or detonation (see Service Engineering Bulletin SB003) can all cause this form of cracking. Unless the cause of the cracking is found and corrected, replacing the cracked piston may not effect a permanent cure.