Service Engineering Bulletin

AUSTRALIA engine TECHNICAL

SB012

Crankshaft Thrust Faces

Crankshaft surface finish and shape are key factors affecting the performance of all bearings. These factors become even more critical for thrust surfaces. As in any bearing, increased loading reduces oil film thickness between shaft and bearing surfaces. This is a much more critical situation in thrust bearings due to their flat faces, which make formation of an oil film extremely difficult. While radial bearings can carry loads measured in tens of thousands of kilograms per square millimetre of projected bearing area, thrust bearings can only support a few thousand kg/mm^2. Radial bearings (those which carry loads in a radial direction like rod and main bearings) form a natural wedge where shaft and bearing surfaces come together in the clearance space. Shaft rotation pulls a wedge of oil into the loaded area of the bearing and forms an oil film that supports the load.

Thrust faces, on the other hand, are made up of two flat surfaces that do not form a natural wedge where they meet. In order to help form an oil film, artificial wedge shaped areas are machined into the bearing surfaces at the ends and sometimes adjacent to the grooves. In spite of all the common design efforts, thrust bearings still run on a much thinner film of oil that makes *crankshaft surface finish critical* in the successful performance of these bearings.

Obtaining a good finish on the thrust face of a crankshaft can be difficult to obtain because it is done using the side of the grinding wheel. Side grinding causes marks that spiral outward toward the OD of the thrust face and may also cause crosshatch marks resembling honing patterns. Both patterns are detrimental to the formation of an oil film because they work like wipers as the shaft rotates. Grinding marks must be removed by fine polishing so that only a circumferential/circular pattern remains.

The grinding wheel side face must be dressed periodically to provide a clean, sharp cutting surface. A grinding wheel that does not cut cleanly may create hot spots on the work piece, leading to a wavy, out-of-flat surface. The side of the wheel must also be dressed at exactly 90° to its OD to produce a thrust face that is square to the axis of the main bearing journal. Surface finish should be checked in a tangential direction and must be held to 0.25 µm Ra maximum. **The higher the load, the smoother the surface finish requirement. The smoother the surface finish, the more bearing surface available.** The thrust surface should be flat within 0.005 mm maximum.

AVOID - SWIRL PATTERN

AVOID - CROSSHATCH PATTERN

Reference: Clevite Engine Parts Technical Bulletins TB2043 & TB2056