



PRESSURE DAM BEARING



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XLPDAM.DWG

Description:

The classical pressure dam bearing has 2 axial oil feed grooves and 2 pads. Typically, there is a pocket in one pad with the other plain pad either containing or not containing a circumferential relief groove.

Application:

The most common applications are steam turbines and gear boxes. In high speed gear boxes, the gear loading may vary from several thousand pounds at 100% load to only a few hundred pounds at partial load. This large variance in load is often accompanied by a change in load direction. An example is a high speed gear box between the low pressure and high pressure centrifugal compressors in an air compression train for an ammonia plant. In this particular application, step bearings are used in the gear box to ensure stable operation during start-up at partial load.

Perspective:

Pressure dam or step journal bearings have long been used to improve the stability of turbomachinery as replacements for plain journal or axial groove bearings. In many cases, these bearings provide a quick and inexpensive fix for machines operating at high speeds near or above the stability threshold. Pressure dam bearings are easily manufactured, relatively insensitive to design tolerances, and available for quick retrofits in existing 2 axial groove bearing inserts. The details of the surface inside the pocket are of secondary importance since the side lands hold the flow and the pressure. The hydrodynamic load created by the pocket provides the increased margin of stability for step bearings compared to plain bearings. Also, the tolerance on the pocket depth is not as critical as lobe clearance tolerances for multi-lobe bearings.

References:

1. **Nicholas, J. C.**, Allaire, P. E., "Analysis of Step Journal Bearings - Finite Length, Stability," ASLE Transactions, 23 (2), pp. 197-207 (April 1980).
2. **Nicholas, J. C.**, "Stabilizing Turbomachinery with Pressure Dam Bearings," Encyclopedia of Fluid Mechanics, 2, Gulf Publishing Co. (1986)