

Hydrodynamic Journal Bearing Design Methodology

1. Make initial guesses for geometry (L, D), assume operating temp.
2. Find optimal S value from chart (Fig. 12-16).
3. Find h_0/c .
4. Check minimum film height, h_0 .
5. Calculate Flow Rate, Q. Calculate Side Leakage, Q_s .
6. Calculate friction, frictional torque and power loss.
7. Steps 5 and 6 can be combined if you are just trying to find the lubricant temperature rise. Then use Fig. 12-24 or alternative equations given in class for a self-contained bearing.
8. Calculate increase in temperature and effect on Viscosity, or need for cooling system. The increase in temperature should be small in comparison to the operating temperature, unless a robust cooling system is used.
9. If applicable, consider start-up and shut-down (Low Speeds).
10. Make corrections and iterate as needed (return to step 1).

The above is just a guide and for specific problems you may have to change your approach. Also, based on what initial guesses and assumptions you make you will produce different designs. Thus, there may be multiple designs which are valid and solve a given problem.