Section - I

1. Concept of bearing characteristic number:

Bearing characteristic number = ZN/P

where

N - speed of the journal (rpm)

P - bearing pressure (N/mm^2)

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Procedure (Steps) for design of journal bearing

The following procedure is adopted for designing a journal (when the bearing load diameter and speed of shaft are known.

Step - I :- Bearing dimension :- Calculate the bearing length by choosing a ratio of l/d from data book

Step - II :- Bearing pressure :- check the pressure $p = \frac{w}{ld}$ from data book for probable satisfactory value.

Step III :- selection of bearing :- Now assume a lubricant from data book and its operating temperature (t_o) This temperature should be in range of 26.5°C to 60°C

Note :- take 82°C as a maximum temperature. for high temperature installations such as steam turbine.

Step IV :- sommerfield number :- calculate the value of sommerfield number (ZN/P) for the assumed bearing temperature and check status (this value) with corresponding values from data book for determining the possibility of maintaining fluid film operation.

Step V :- <u>clearance ratio</u> :- now assume a clearance ratio from data book.

<u>Step VI</u> :- coefficient of friction :- calculate the coefficient of friction (μ) by using the relation given below.

$$\mu = \frac{9.396}{10}\left(\frac{ZN}{P}\right)\left(\frac{d}{c}\right) + k.$$

Step VII :- Heat Generated: calculate the heat Generated (Q_g) by using the relation given below

$$Q_g = I^2 WV$$

Step VIII : Heat dissipation: Calculate the heat generated (Q_g) by using the relation given below.

$$Q_g = I^2 WV$$

Step IX :- thermal equilibrium: at least

Calculate the thermal equilibrium to see that heat dissipated becomes at least equal to the heat Generated.