

Problem 1.11: Bearing reliability, deep groove ball bearing

Calculate the operating reliability $R(t=1000\text{hr})$ of a deep groove ball bearing. The calculated L_{10} life expectancy of the ball bearing is $L_{10} = 500 \cdot 10^6$ rev. The rotational speed is 4000 rpm.

Hint: The life expectancy of the ball bearings is related to the L_{10} basic rating life according (eq. 4.66, page 129).

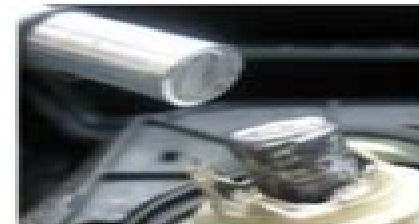
**Problem 1.12: Reliability factor for Fatigue strength**

A power supply is cooled by 3 fans. The correct functioning of at least one of the three fans is required to maintain sufficient cooling. The operating reliability of the system needs to be 99% for a service life of 10.000 hr, $R_s(10.000 \text{ hr}) = 0.99$. The rotational speed is 4000 rpm.

- Estimate the required operating reliability R_i of the individual fans.
- Calculate the required L_{10} of the individual bearings.
- Calculate C/P

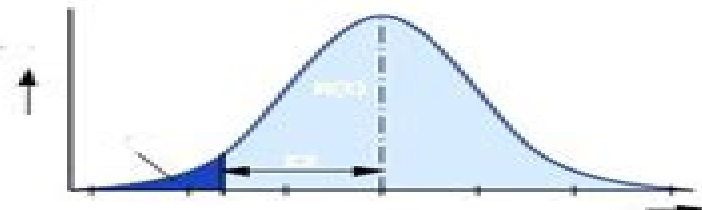
**Problem 1.13: Reliability factor for Fatigue strength**

Data published of the endurance strength are always mean values. In Norton (2000) is reported that the standard deviation of the endurance strength of steels seldom exceeds 8% of their mean. Estimate a correction factor for the endurance strength if a 99% probability is required.

**Problem 1.14: Component reliability**

Calculate the component reliability of a drive shaft (motor shaft) loaded in the High Cycle Fatigue (HCF) regime with $L_n = 2 \cdot 10^5$ load cycles.

Consider the calculated fatigue life of $L_{10} = 3 \cdot 10^5$ load cycles and a standard deviation of $\sigma = 0.2$.

**Problem 1.15: Stress concentration factor**

"A chain is only as strong as its weakest link, regardless of the strength of the stronger links". Do you agree and what do you think about the reliability if the failure mode is fatigue?

Analytical Dynamics Solutions Manual

**Eugeniu Grebenikov, Yu. A.
Mitropolsky, Y.A. Ryabov**



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web acid base titrations are usually used to find the amount of a known acidic or basic substance through acid base reactions the analyte titrand is the solution with an unknown molarity the reagent titrant is the solution with a known molarity that will react with the analyte

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web an acid base titration is a method of quantitative analysis for determining the concentration of an acid or base by neutralizing it using a standard solution of base or acid of known concentration a ph indicator is used to

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web an acid base titration is an experimental technique used to acquire information about a solution containing an acid or base hundreds of compounds both organic and inorganic can be determined by a titration based on their acidic or basic properties acid is titrated with a base and base is titrated with an acid

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web the titration of a weak acid with a strong base involves the direct transfer of protons from the weak acid to the hydroxide ion the reaction of the weak acid acetic acid with a strong base naoh can be seen below in the reaction the

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web as seen in the chapter on the stoichiometry of chemical reactions titrations can be used to quantitatively analyze solutions for their acid or base concentrations in this section we will explore the underlying chemical equilibria that make acid base titrimetry a

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web oct 1 2019 abstract titration is an analytical method used in biomedical sciences and analytical chemistry laboratories to determine the quantity or the concentration of a known or unknown substance there