



HW05

第04章 轴承及轴设计 作业

南方科技大学

HW 05.1

1. 有一混合摩擦径向滑动轴承，轴颈直径 $d = 60\text{mm}$ ，轴承宽度 $B = 60\text{mm}$ ，轴瓦材料为ZCuAl10Fe3，试求：

- (1). 当载荷 $F_r = 36000\text{N}$ ，转速 $n = 150\text{ r/min}$ 时，校核轴承是否满足非液体润滑轴承的使用条件；
- (2). 当载荷 $F_r = 36000\text{N}$ 时，求轴的允许转速 n ；
- (3). 当轴的转速 $n = 960\text{ r/min}$ 时，求轴的允许载荷 F_r ；
- (4). 求轴的最大允许转速 n_{max} 。

1. If there is a mixed friction journal bearing, where the shaft journal diameter $d = 60\text{mm}$, the width of the bearing $B = 60\text{mm}$, and the material of the bearing shell is ZCuAl10Fe3.

- (1) If the load $F_r = 36000\text{N}$, and the shaft speed $n = 150\text{ r/min}$, does the bearing meets the standard for non liquid lubricated bearings in this working condition?
- (2) When the load $F_r = 36000\text{N}$, find the allowable speed of the shaft, n ;
- (3) If the speed $n = 960\text{ r/min}$, what is the allowable load, F_r ?
- (4) What is the maximum allowable speed, n_{max} ?

HW 05.2

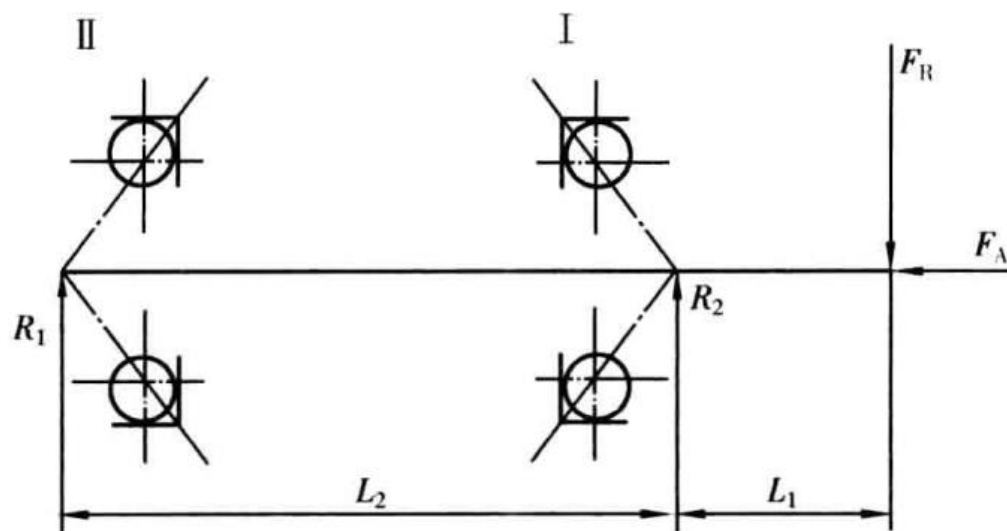
2. 一轴上装有一对6313型深沟球轴承，轴承所受的负荷 $R_1 = 5500\text{ N}$ 、 $A_1 = 3000\text{ N}$ 、 $R_2 = 6500\text{ N}$ 、 $A_2 = 0$ ，其转速 $n = 1250\text{ r/min}$ ，运转时有轻微冲击，预期寿命 $L_h \geq 5000\text{ h}$ 。试分析该轴承是否合用。

A pair of type-6313 deep groove ball bearing is assembled on a shaft, and the loads on the shaft are $R_1 = 5500\text{ N}$ 、 $A_1 = 3000\text{ N}$ 、 $R_2 = 6500\text{ N}$ 、 $A_2 = 0$. The speed of the shaft $n = 1250\text{ r/min}$, and slight impact exists during the operation. The life expectancy for the shaft and bearing $L_h \geq 5000\text{ h}$. Please analyze whether the bearings meets the standard.

HW 05.3

如图所示，一根轴用两个角接触球轴承支承， $L_1 = 50\text{mm}$ ， $L_2 = 150\text{mm}$ ，轴端作用轴向力 $F_A = 800\text{N}$ ，径向力 $F_R = 1500\text{N}$ 。试分别求出两轴所承受的径向负荷 R_1, R_2 ，以及轴向负荷 A_1, A_2 。（轴承内部轴向力 $S = 0.7R$ ）

As shown in the figure, a shaft is supported by two angular contact ball bearings, where $L_1 = 50\text{mm}$, $L_2 = 150\text{mm}$, the axial force $F_A = 800\text{N}$, radial force $F_R = 1500\text{N}$. Please find out the radial load R_1, R_2 , and axial load A_1, A_2 for the 2 axis. (the axial force inside the bearings are $S = 0.7R$)



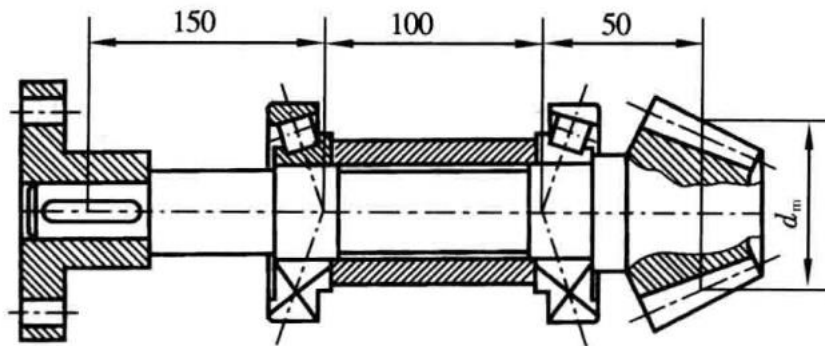
HW 05.4

如图所示的锥齿轮减速器主动轴，已知锥齿轮的平均分度圆直径 $d_m = 56.25\text{mm}$ ，所受圆周力 $F_t = 1130\text{N}$ ，径向力 $F_r = 380\text{N}$ ，轴向力 $F_a = 146\text{N}$ 。

- (1) 画出轴的受力简图；
- (2) 计算支承反力；
- (3) 画出轴的弯矩图、合成弯矩图及转矩图。

A driving shaft of a bevel gear reducer is as shown in the figure below. The pitch circle diameter for the bevel gear $d_m = 56.25\text{mm}$, the circumferential force $F_t = 1130\text{N}$, the radial force $F_r = 380\text{N}$, the axial force $F_a = 146\text{N}$.

- (1) Please draw the simplified force diagram of the shaft.
- (2) Calculate the bearing reaction.
- (3) Draw the bending moment, the resultant bending moment, and the torque on this shaft.





ME311: 机械设计

2023年秋季

Deadline of this homework: Nov 21 @ **23:30**

Link to submission:

https://ancorasir.com/?page_id=3987

All homework MUST be hand-written.

No late submission is allowed!

Please refer to the above link for further details on how to make the submission and the detailed deadline for submission.

谢谢~

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