

机械设计

Mechanical Design

HW06

第06章 挠性传动设计  
作业

所有作业要求手写

Autumn 2024

# HW 06.1

- 某牙嵌式离合器用的圆柱螺旋压缩弹簧的参数如下：弹簧外径  $D=36\text{mm}$ ，弹簧丝直径  $d=3\text{mm}$ ，有效的圈数  $n=5$ ，弹簧材料为碳素弹簧钢丝（C级），其  $\sigma_B=1570\text{MPa}$ ， $[\tau]=0.5\sigma_B=785\text{MPa}$ ， $G=82140\text{MPa}$ ，最大工作载荷  $F_{\max}=100\text{N}$ ，载荷性质为II类，试校核此弹簧的强度，并计算其最大变形量  $\lambda_{\max}$ 。
- The parameters of a cylindrical helical compression spring for a tooth-inserted clutch are as follows: spring outer diameter  $D=36\text{mm}$ , spring wire diameter  $d=3\text{mm}$ , effective number of coils  $n=5$ , the spring material is carbon spring steel wire (Class C), its  $\sigma_B=1570\text{MPa}$ ,  $[\tau]=0.5\sigma_B=785\text{MPa}$ ,  $G=82140\text{MPa}$ , the maximum working load  $F_{\max}=100\text{N}$ , the nature of load is Class II, try to check the strength of this spring and calculate its maximum deformation  $\lambda_{\max}$ . The maximum working load  $F_{\max}=100\text{N}$  and the nature of the load is II, try to check the strength of this spring and calculate its maximum deformation  $\lambda_{\max}$ .

# HW 06.2

• 如图所示为一V带传动，已知主动轮直径  $d_1 = 360 \text{ mm}$ ，从动轮直径  $d_2 = 180 \text{ mm}$ ，包角  $\alpha_1 = 210^\circ$ ， $\alpha_2 = 160^\circ$ ，带与轮间的当量摩擦系数  $f_v = 0.4$ ，带的张紧力  $F_0 = 180 \text{ N}$ 。试问：

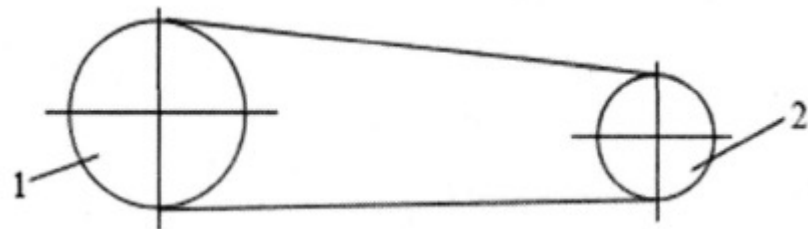
(1) 当从动轮需克服阻力矩  $T_2 = 20 \text{ N} \cdot \text{m}$  时，主动轮在足够大的电机驱动下会出现什么现象？

(2) 此时紧边、松边的拉力各为多少？

As shown in the figure, this is a V-belt drive. The diameter of the driving wheel  $d_1 = 360 \text{ mm}$ , the diameter of the driven wheel  $d_2 = 180 \text{ mm}$ , the wrap angle  $\alpha_1 = 210^\circ$ ,  $\alpha_2 = 160^\circ$ , the equivalent friction coefficient between the belt and the wheel  $f_v = 0.4$ , and the belt tension  $F_0 = 180 \text{ N}$ . Question:

(1) When the driven wheel needs to overcome the resistance torque  $T_2 = 20 \text{ N} \cdot \text{m}$ , what phenomenon will occur when the driving wheel is driven by a sufficiently large motor?

(2) What are the tensions on the tight side and the loose side at this time?



# HW 06.3

- 设计某带式输送机传动系统中第一级用的普通V带传动。已知电动机功率 $P=4\text{kW}$ ，转速 $n_1=1440\text{r/min}$ ，传动比 $i=3.4$ ，每天工作8h。

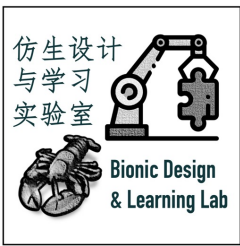
Design of a belt conveyor drive system used in the first stage of the ordinary V-belt drive. It is known that the motor power  $P = 4\text{kW}$ , speed  $n_1 = 1440\text{r/min}$ , transmission ratio  $i = 3.4$ , 8h per day work;

- (1) 选择V带的带型并给出理由；

Select the belt type of the V-belt and give reasons;

- (2) 确定V带的中心距 $a$ 和基准长度 $L$ 和小带轮上的包角 $\alpha_1$ ；

Determine the center distance  $a$  and the reference length  $L$  of the V-belt and the wrap angle  $\alpha$  on the small pulley.



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**Thank you~**

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