Program for Design of Belt Drive, Problem 4.

Problem Statement: An electric motor is to drive an exhaust fan by means of a flat leather belt. The following data is known: Motor pulley and Fan pulley diameter 400 mm and 1200 mm respectively. The angle of contact is 2.5 radians and 3.5 radians. Coefficient of friction is 0.3 and 0.25. The speed is 900 rpm while the power to be transmitted is 25 kW. The thickness of the belt is 6mm and the maximym permssible stress is 2.1 MPa. Take density as 1000 kg/m^3. Find the width of the belt.

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clc;

clear all;

Intializing the known values for the motor(1) and fan pulley(2):

P=25

D1=400

D2=1200

N1=900

t=6

mu\_1=0.3

mu\_2=0.25

roh=1000

g=9.81

S\_d=2.1

tt\_1=2.5

tt\_2=3.75

Finding the velocity:

N2=(D1\*N1)/D2

V=(pi\*(D2+t)\*N2)/(60\*1000)

As the coefficient of friction is varying for both the pulleys, the width of the belt is dependent on the smaller value of mu\*tt(angle of contact).

Hence we find the width using equation 14.5ab and standardize it using values from Table 14.9a

if (mu\_1\*tt\_1)<(mu\_2\*tt\_2)

fprintf("Design is based on motor pulley\n")

[b]=Eqn14\_5a\_b(P,S\_d,t,V,roh,g,mu\_1,tt\_1)

else

fprintf("Design is based on fan pulley\n")

[b]=Eqn14\_5a\_b(P,S\_d,t,V,roh,g,mu\_2,tt\_2)

b = Table\_14\_9\_a(b)

end