Program for Design of Belt Drive, Problem 6.

Problem Statement: A horizontal drive is required to drive a compressor by means of an electric motor, select suitable flat belt drive from the following details: Power = 6 kW

Slip = 2.5%

Speed of motor pulley = 1,400 rpm

Service factor = 1.2

Working stress = 2 Mpa

Speed of compressor = 500 rpm

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clc;

clear all;

Intalizing the following details:

P = 6

E = 0.025

N = 1400

n = 500

Cs = 1.2

S\_d = 2

eta = 0.9

Finding the power using service fator.

Pd = P\*Cs

Finding the diameter of the smaller pulley and standrdizing it:

Wmax = (2\*pi\*N)/60

D2 = 630\*((Pd/Wmax)^(1/3))

D2 = Table\_14\_13\_b(D2)

Finding the diameter of the driven pulley and standardizing it:

i = N/n

D1 = (1-E)\*D2\*i;

D1 = Table\_14\_13\_b(D1)

Finding the belt speed:

v = (pi\*D2\*N\*(1-E))/(1000\*60)

Finding the distance between the centers of the pulleys:

C = 2\*(D1+D2)

Find the coefficient of friction using Barths Formla:

[mu]=Barths\_Formula(v)

Finding the length of the belt:

[L]= Eqn14\_2b(C,D1,D2)

Finding the angle of Contact:

tt\_l = pi + (D1-D2)/C

tt\_s = pi - (D1-D2)/C

Finding the width of the belt when the design is based on the pulley i.e mu\*theta\_s

t = 0.02\*D2;

roh=1000;

g=9.81;

[b]=Eqn14\_5a\_b(P,S\_d,t,v,roh,g,mu,tt\_s);

[b] = Table(b)

Finding the centrifugal tension:

[Tc] = Eqn14\_3\_e(b,t,v)

syms T1 T2 To

Finding the tensions at each pulley:

E = [(T1-T2)==(Pd\*1000./v),(T1-Tc)/(T2-Tc)==exp(mu\*tt\_s)]

S = solve(E,T1,T2);

To = (((vpa(S.T1))^0.5 + (vpa(S.T2))^0.5)/2)^2