Program for Design of Chain Drive, Problem 1.

Problem Statement: An 800 rpm, 25 kW squirrel cage induction motor is to drive a reciprocating pump at 200 rpm. The pump is to run at full load for 24 hours a day. Select a suitable roller chain drive, if the center distance is as short as possible.

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clc;

clear all;

Intializing the given variables:

P = 25

N1 = 800

N2 = 200

Finding the velocity ratio:

i = N1/N2

[z2,z1] = Table\_14\_36\_a(i);

z1

z2

Finding the pitch using equation 12.22 b:

[p] = Eqn14\_22\_b(N1)

[p1,W,Fu] = Table\_14\_39\_b(p)

PCD of sprockets

D1 = p1/(sind(180/z1));

D2 = p1/(sind(180/z2));

C1 = D1+D2;

Finding the velocity of the chain using equation 14.22 a:

[v] = Eqn14\_22\_a(p1,z1,N1)

Finding the tangential force:

F = (1000\*P)/v

Finding the allowable working load per strand, given that the service condition is 24 hr a day and EasyStarting, smooth and Steady Load:

[Ks] = Table\_14\_35()

Finding the number of strands and the actual factor of safety:

FS = 11.7

[Fw] = Eqn14\_22\_e(Fu,FS,Ks)

j = ceil(F/Fw)

Fc = (W\*(v^2))/9.81

Assuming horizontal drive:

K2 = 6;

Fs = K2\*W\*(C1/1000);

FS\_actual = j\*((Fu\*1000)/(F+Fc+Fs));

fprintf('Fs\_actual:%f \n',FS\_actual);

if FS\_actual>FS

disp('Chain is Safe');

else

disp("Chain is unsafe");

end

Finding the chain length in pitches:

Cp = C1/P

alpha = asind((D2-D1)/(2\*C1))

fprintf('Alpha : %f \n',alpha)

[Lp] = Eq14\_22\_k(z1,z2,Cp,alpha)

Finding the chain length and exact center distance :

L = P\*Lp

[Ce] = Eqn14\_22\_kCe(Lp,z1,z2,alpha,P)

Ce = Ce/2