Program for Design of Spur Gear, Problem 7.

Problem Statement: A 12 kW motor running at 1170 rpm drives a fan through a pair of spur gears (forged steel SAE 1030 pinion and CI gear) with a reduction ratio 3.9:1. Design the gear and check for dynamic and wear loads.

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clc;

clear all;

Intialzing the given data:

P = 12

N1 = 1170

i = 3.9

N2 = N1/i

alpha = 14.5

Finding the number of teeth ing pinion and gear:

z1 = 20

z2 =i\*z1

Finding the lewis form factor:

[y1]=Lewis(z1)

[y2]=Lewis(z2)

Finding the stress value for both gear and pinion:

[S\_d] = Table\_12\_7();

S\_d1 = S\_d;

[S\_d] = Table\_12\_7();

S\_d2 = S\_d;

Finding the strength factor to decide what the design is based on:

if S\_d1\*y1<S\_d2\*y2

disp("Design is based on pinion")

S\_d=S\_d1;

Y=pi\*y1;

z=z1;

else

disp("Design is based on gear")

S\_d=S\_d2;

Y=pi\*y2;

z=z2;

end

Finding the module and standardizing it:

N2 = N1/i

Mt = ((P\*1000\*60)/(2\*pi\*N2))\*10^3;

k = 10

Cv = 0.5

[m] = Eqn\_12\_5\_b(Mt,S\_d,Cv,k,Y,z)

[m] = Tb12\_2\_1a(m)

Finding the PCD of pinion and gear respectively:

d1 = m\*z1

d2 = m\*z2

Finding the face width, velocity and Tangential Force :

b = 10\*m

v = (pi\*d2\*N2)/(1000\*60)

if v<=8

Cv1 = 3.05/(3.05+v);

elseif v>8 && v<=13

Cv1 = 4.58/(4.58+v);

elseif v>13 && v<=20

Cv1 = 6.1/(6.1+v);

elseif v>20

Cv1 = 5.55/(5.55+sqrt(v));

end

Ft = (2\*Mt)/(d2)

Verifying if the values found are satifactory:

S\_d22 = Ft/(pi\*Cv1\*b\*y2\*m\*10^3);

if S\_d22 >S\_d2

disp('Values are not satisfactory');

else

disp('Values are satisfactory');

end

Finding the dynamic load:

K3 = 20.67

e1 = Table\_12\_14(v)

k1 = 8.7;

C = 457.8

e = 0.04

C = (C\*e1)/e

[Fd] = Eqn\_12\_12(Ft,K3,v,C,b);

Fd = Fd\*10^-3

Finding the Wear and finding if the material is safe against wear:

[Q] = Eqn\_12\_15\_c(z1,z2)

S\_es = 429;

K = 0.598

[Fw] = Eqn\_12\_15\_a(K,Q,b,d1)

if Fw>Fd

disp('Material is Safe against wear');

else

disp('Material is not safe against wear');

end

As the material is not safe against wear the BHN number should be changed using table 12.16