Program for Design of Bevel Gear, Problem 7.

Problem Statement: A pair of straigh t tooth bevel gears at right angles is to transmit 5kW at 1200 rpm of the pinion. The diameter of the pinion is 80 mm and the vlocity ratio is 3.5. The tooth form is 14 1/2 degrees. Both pinion and gear are cast iron with allowable stress of 55 N/m2. Determine the module, face witdth from the standpoint of strength and also check tthe design from stand point of dynamic load and wear.

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clc;

clear all;

Intializing the variables:

theta = 90

P = 5

N1 = 1200

d1 = 80

ii = 3.5

alpha = 14.5

S\_dg = 55

Finding the diameter and rpm of the gear:

d2 = ii\*d1

N2 = N1/ii

As both are made of the same material , pinion is weaker. Finding the pitch angel using equation 12.32(a):

del\_p = Eqn\_12\_32\_a(ii)

del\_g = Eqn\_12\_32\_b(ii)

Finding the number of virtual teeth for pinion and gear:

z1 = 24

z2 = ii\*z1

ze = Eqn\_12\_25\_d(z1,del\_p);

zep =ze

ze = Eqn\_12\_25\_d(z2,del\_g);

zeg =ze

Find the velcoity and the velocity factor:

v = ((pi\*d1\*N1)/(60))

%Cv = ((6.1)/(6.1+v))

Cv = 0.5482

Finding the tangential force using equation 12.38(b):

Ft = ((1000\*P)/(v))

Finding the format using expression below equation 12.37:

Y = pi\*(0.124-((0.684)/(zep)))

Fnding the cone using equation 12.33:

L = 0.5\*(sqrt(d1^2+d2^2))

Finding the face width usign equation 12.36(b)

b = L/3

m = ((Ft\*1000)/(S\_dg\*Cv\*b\*Y))\*((L)/(L-b));

m = Table\_12\_24(m);

m = 4

Findthen number of teeth on gears and pinion:

z1 = d1/m

z2 = d2/m

Finding the zep and zeg values :

ze = Eqn\_12\_25\_d(z1,del\_p);

zep =ze

ze = Eqn\_12\_25\_d(z2,del\_g);

zeg =ze

Finding the induced streess and the new form factor:

Y\_new = pi\*(0.124- ((0.684)/(zep)))

S\_d\_ind = ((Ft\*1000)/(Ft\*Cv\*b\*Y))\*((L)/(L-b))

if S\_dg > S\_d\_ind

disp("The calculated values are less than permissible values hence the assumed values are satisfactory.");

else

disp("The calculated values are greater than permissible values hence the assumed values are not satisfactory.");

end

Finding the dynamic tooth load:

K3 = 20.67

e1 = 0.0640

e2 = 0.06

C = 353.39

C = C/e2 \* e1

Fd = Ft + ((K3\*v\*(C\*b+Ft))/(K3\*v+sqrt(C\*b+Ft)))

For wear load(Fw) :

Q = ((2\*zeg)/(zep+zeg))

K = 1.324

Fw = ((d1\*b\*Q\*K)/(cos(del\_g)))

if Fw >= Fd

disp("Safe against wear");

else

disp("Not safe against wear");

end