Program for Design of Bevel Gear, Problem 14.

Problem Statement: The vertical spindle of a drilling machine is to be driven by a pair of straight bevel gears wih 20 degree involute teeth. The speed reduction is 4:1. The drill requires a power of 50 kW at 720 rpm. A service factor of 1.35 may be taken, and choose suitable materials for the gear and pinion. Design the gear pair.

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Name: Avva Sai Pranav

USN: PES1201800861

clc;

clear all;

Intializing the given data:

alpha = 20

theta = 90

ii = 4

z1 = 20

P = 50

N1 = 720

Cv = 1.35

Finding the number of teeth on gear and rpm of the gear respectively:

z2 = z1\*ii

N2 = N1/ii

Finding the delta values for pinion and gear using equation 12.32(a) and 12.32 (b):

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

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

Finding the lewis form factor:

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

zep = ze

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

zeg = ze

[y1]=Lewis(zep)

[y2]=Lewis(zeg)

Finding the design stress using table 12.7:

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

S\_d1 = S\_d;

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

S\_d2 = S\_d;

Find the strength factor, find the weaker part and deciding 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 torque:

Mt = ((9.55\*10^6\*P)/(N2))

Finding the module:

m = module(Mt,S\_d,Cv,Y,z1,z2,z);

m = Table\_12\_24(m)

Finding the pitch diameter of pinion and gear using Equation 12.1(e) respectively :

d1 = m\*z1

d2 = ii\*d1

Finding the core distance(L):

L = (1/2)\*sqrt(d1^2+d2^2)

Finding the face width using equation 12.36(b):

b = L/3

Finding the velocity and the

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

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

FInding the tangential force using Equation 12.38(b):

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

Finding the design stress induced and if it lies between the permissible values:

S\_di = (Ft/(m\*Cv\*b\*Y))\*(L/(L-b))

if S\_di < S\_d

disp("The calculated values lie between the permissible values");

else

disp("The calculated values lies outside the permissible values");

end

hence the diameter for the gear pair of pinion and gear respectively:

d1

d2