Program for Design of Springs, Problem 7 .

Problem Statement:An automotive single plate clutch consists of two pairs of friction surfaces, one between the friction lining and the prssure plate and te other between the friction lining and the flywheel as shown in figure 3. Eight identical helical compression srings, arranged in parallel, provide the reqired axial thrust on the friction surface. The total spring force exerted by all springs is 2400 N and the corresponding deflection of each spring is approximately 15 mm. The spring index can be taken as 8. The springs are made of patented and cold-drawn steel wire with ultimate tensile strength of 1390 N/mm2and tmodulus of rigidity of 8130 N/mm^2. The permissible shear stress for the spring wire can be take as 30% of the ultimate tensile strength.

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clc;

clear all;

Intializing the given data:

F = 2400

y = 15

S\_u = 1390

C = 8

G = 81370

Finding the wire diameter:

F = F/8

tau = 0.3\*S\_u

[K] = Eqn11\_2\_a(C)

[d] = Round(Eqn11\_1d\_d(F,C,K,tau))

Finding the mean coil diameter:

D = C\*d

Finding the number of active coils:

[N]=ceil(Eqn11\_5a\_i(F,D,G,d,y))

Finding the total number of coils:

[Nt,f] = Table\_11\_4(N)

Finding the solid length:

S\_L = Nt\*d

Finding the free length of the spring:

[y\_act]=Eqn11\_5a(F,D,G,d,N)

g=1

T\_ag=(Nt-1)\*g

F\_L=(S\_L+T\_ag+y\_act)

[F\_L]=ceil(F\_L)

Finding the pitch of the coil:

p = F\_L/(Nt-1)

Finding the required spring rate:

k = F/y

Finding the actual spring rate:

k\_act=(G\*d^4)/(8\*D^3.\*N)