Program for Design of Springs, Problem 8 .

Problem Statement: A safety valve operated by a helical tension spring through a leverl mecanism is chematically illustraed. The diameter of the valve is 50 mm. In normal operating conditions, the vlave is closed and pressure inside is the chamber is 0.5 N/mm^2. The vlave is opened when the pressure inside the chamber increases to 0.6N/mm^2. The maximum lift of the valve is 5mm. The spring index can be taken as 8. The spring is made of patented and cold-drawn steel wire with the ultimate tensile strength of 1200 N/mm^2 and the modulus of rigidit of 81360 N/mm^2. The permissible shear stress for the spring wire can be taken as 30% of the ultimate tensile strength.

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clc;

clear all;

Intializing the given values:

d1 = 75

d2 = 150

D = 50

Pc=0.5

Po=0.6

ymax=5

S\_u = 1200

C = 8

G = 81370

FInding the wire diameter under the following conditions:

i)When the valve is closed:

Pvc=(pi/4)\*D^2.\*Pc

Psc=d1\*Pvc/d2

ii) When the valve si closed:

Pvo=(pi/4)\*D^2.\*Po

Pso=d1\*Pvo/d2

y=ymax\*d2/d1

k=(Pso-Psc)/y

F=max(Psc,Pso)

tau=0.3\*S\_u

[K]=Eqn11\_2a(C)

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

[d]=ceil(d)

Finding the mean coil diameter:

D = C\*d

Finding the number of active coils:

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

N=ceil(N)