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**Question:**

**An engine of a car has a single plate clutch developed maximum torque 147 N-m. External diameter of clutch plate is 1.2 times its internal diameter. Determine the dimension of clutch plate and axial force provided by the spring. The maximum pressure intensity of the clutch facing 98 kN/m<sup>2</sup> and coefficient of friction is 0.3. Assume uniform wear condition.**

**Answer:**

Max. Torque  $T = 147 \text{ N-m}$ ,  $n = 2$

$d_1 = 1.2 d_2$ ,  $\mu = 0.3$ ,  $P_{\max} = 98 \times 10^3 \text{ N/m}^2$   
uniform wear condition

$$\text{Mean rad. } R = \frac{r_1 + r_2}{2} = \frac{1.2 r_2 + r_2}{2} \\ = 1.1 r_2$$

$$T = n \mu W R = 2 \times 0.3 \times W \times 1.1 r_2$$

$$\therefore W = 222.7 r_2 \quad \text{--- (1)}$$

$$\text{Also, } p \cdot r_2 = C \quad \therefore C = 98 \times 10^3 r_2 \quad \text{--- (2)}$$

$$\text{But } W = 2\pi C (r_1 - r_2)$$

$$222.7 r_2 = 2\pi \times 98 \times 10^3 r_2 (1.2 r_2 - r_2)$$

$$222.7 = 123088 r_2$$

$$\therefore r_2 = 1.8 \text{ mm}$$

$$\& r_1 = 1.2 \times 1.8 = 2.1 \text{ mm}$$

$$W = 222.7 \times 1.8 \times 10^{-3}$$

$$= 0.40 \text{ N}$$