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at $R=R_1$:

$$\sigma_t = P_i(R_1^2 + R_2^2)/(R_2^2 - R_1^2)$$

$$\sigma_r = -P_i$$

at $R=R_2$:

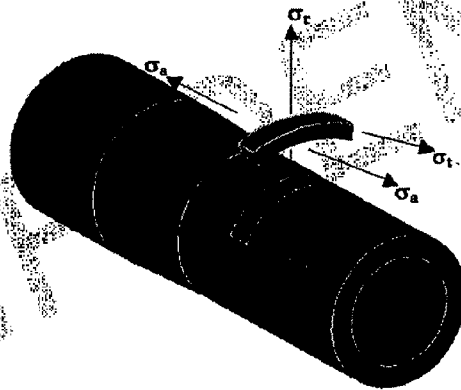
$$\sigma_t = 2R_1^2 P_i/(R_2^2 - R_1^2)$$

$$\sigma_r = 0$$

Stress State at OD

Two-dimensional stress state, Tangential (hoop - σ_t) stress plus Longitudinal (axial - σ_a) stress only.

Note: Radial stress = 0 at the outer surface.



The Maximum Principal Stress is therefore equal to the Tangential Stress(σ_t) and the Minimum Principal stress is equal to the Axial Stress(σ_a) at the OD. The relationship between strain on the outer surface in these directions to stress is given by the equations:

$$\sigma_{Max} = E (\epsilon_1 + \mu \epsilon_2)/(1 - \mu^2) = \sigma_t$$

$$\sigma_{Min} = E (\epsilon_2 + \mu \epsilon_1)/(1 - \mu^2) = \sigma_a$$

Feb. '02 - 12 Ga. Shotgun Down Bore Barrel Stress;
R & D Technical Center Project No. 241306; TLW 0738
file: C:\Franz Data\Firearm Projects\Gas Autoloader-MDK\TLW0738-Report.doc

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