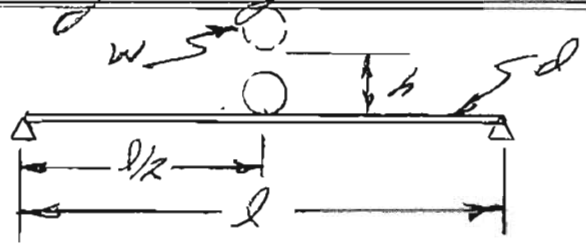
Falling Weight on Simply Supported Beam



$W = 5$ lbs
$h = 1$ in

Simply Supported Beam, Circular Cross Section
$l = 24$ in $\quad d = 1/2$ in.

Generic Steel Let $E = 30 \times 10^6$ lb/in^2
$w = .283$ lb/in^3

The maximum force due to impact of a falling weight onto an simply supported beam is:

$$F_{max} = W\left[1 + \sqrt{1 + \frac{2h}{\delta_{st}}\left(\frac{1}{1 + \frac{17}{35}\frac{W_b}{W}}\right)}\right]$$ Approximate Solution

where $W_b = A_b l_b w_b = \frac{\pi}{4}(1/2)^2(24)(.283) = 1.334$ lbs

$$\delta_{st} = \frac{W l^3}{48 E I} = \frac{(5\text{ lb})(24\text{ in})^3}{48(30\times10^6 \frac{\text{lb}}{\text{in}^2})\frac{\pi}{64}(1/2)^4} = 0.018\text{ in}$$

Substituting ...

$F_{max} \doteq 57.8$ lbs Approximate