

Appendix A: Centroids and Area Moments of Inertia

SHAPE	DIMENSIONS	CENTROID (x_c, y_c)	AREA MOMENT OF INERTIA
Rectangle		$(\frac{1}{2}b, \frac{1}{2}h)$	$I_{x'} = (1/12)bh^3$ $I_{y'} = (1/12)hb^3$ $I_x = (1/3)bh^3$ $I_y = (1/3)hb^3$ $J_C = (1/12)bh(b^2 + h^2)$
Triangle		$y_c = (h/3)$	$I_{x'} = (1/36)bh^3$ $I_x = (1/12)bh^3$
Trapezoid		$y'_c = \frac{h(2B + b)}{3(B + b)}$ Note that this is measured from the top surface.	$I_{x'} = \frac{h^3(B^2 + 4Bb + b^2)}{36(B + b)}$ $I_x = \frac{h^3(B + 3b)}{12}$
Quarter-Circle, of radius r		$((4r/3\pi), (4r/3\pi))$	$I_x = I_y = (1/16)\pi r^4$ $J_O = (1/8)\pi r^4$
Half Circle, of radius r		$(0, (4r/3\pi))$	$I_x = I_y = (1/8)\pi r^4$ $J_O = \frac{1}{2}\pi r^4$ $I_{x'} = .11r^4$
Circle, of radius r		$(0,0)$	$I_x = I_y = \frac{1}{2}\pi r^4$ $J_O = \frac{1}{2}\pi r^4$
Parabolic Area		$(0, (3h/5))$	$I_x = 4h^3a/7$ $I_y = 4ha^3/15$
Parabolic Spandrel		$((3a/4), (3h/10))$	$I_x = ah^3/21$ $I_y = 3ha^3/15$

STATICS