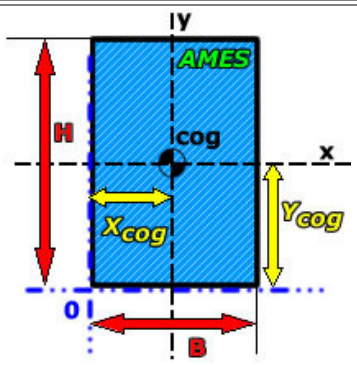
Advanced Mechanical Engineering Solutions

SECTIONAL PROPERTIES CALCULATOR - SOLID RECTANGULAR BAR

Rectangular bars (including square bar) are solid flats) with rectangle cross section. They are g produced from stainless steel, carbon steel, alloy s aluminum. Manufacturing method for rectangular l cold/hot rolling and drawing. Rectangular bars are of manufacturers in variety of sizes. Steel rectangular covered by ASTM A108 “Standard Specification f Bar, Carbon and Alloy, Cold-Finished”, A36/A36m “S Specification for Carbon Structural Steel” and AST “Standard Specification for Stainless Steel Bars and standards.

The following calculator has been developed to calcu sectional properties of rectangular solid bar.

Calculator:



INPUT PARAMETERS

Parameter	Symbol	Value	Unit
Height	H	200	mm
Width	B	48	
Length	L	8000	

Density	p	0	g/cm^3
Calculate			

OUTPUT PARAMETERS			
Parameter	Symbol	Value	Unit
Cross section area	A	9600	mm^2
Mass	M	0	kg
Second moment of area	I_{xx}	32000000	mm^4
Second moment of area	I_{yy}	1843200	
Section modulus	S_{xx}	320000	mm^3
Section modulus	S_{yy}	76800	
Radius of gyration	r_x	57.735	mm
Radius of gyration	r_y	13.856	
CoG distance in x direction	x_{cog}	24	mm
CoG distance in y direction	y_{cog}	100	

Note: Use dot "." as decimal separator.

Definitions:

Second Moment of Area: The capacity of a cross-section to resist bending.

Radius of Gyration (Area): The distance from an axis at which the area of a body may be assume concentrated and the second moment area of this configuration equal to the second moment area of the act about the same axis.

Section Modulus: The moment of inertia of the area of the cross section of a structural member divide distance from the center of gravity to the farthest point of the section; a measure of the flexural strength of th

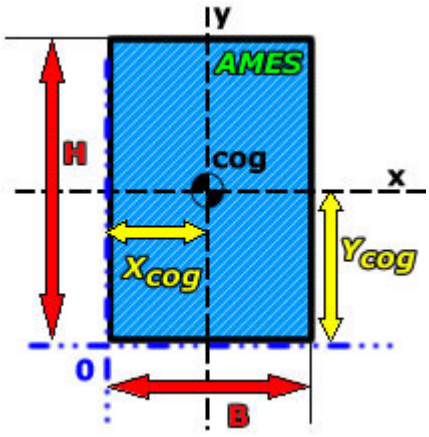
Supplements:

Link	Usage

Simply Supported Beam Deflection Calculation Example	An example on calculation of max. deflection, max. shear force, max. bending moment and mid-span slope/deflection of a simply supported beam under multiple point loads and a distributed load.
Rectangular Beam Design for Strength	This calculator has been developed to calculate normal stress, she stress and Von Mises stress on a given cross section of a rectangular sol beam.

List Of Equations:

SOLID RECTANGLE



Step	Parameter/Condition	Symbol	Equation
1	Cross section area	A	$A = BH$
2	Area moment of inertia	I_{xx}	$I_{xx} = BH^3/12$
3	Area moment of inertia	I_{yy}	$I_{yy} = HB^3/12$
4	Section modulus	S_{xx}	$S_{xx} = I_{xx}/y_{cog}$
5	Section modulus	S_{yy}	$S_{yy} = I_{yy}/x_{cog}$
6	Center of gravity	x_{cog}	$x_{cog}=B/2$
7	Center of gravity	y_{cog}	$y_{cog}=H/2$
8	Mass	M	$M = AL\rho$
9	Radius of gyration	r	r = (I/A)^0.5
10	Polar moment of inertia	J	$J = I_{xx} + I_{yy}$

Reference:

- Oberg.E , Jones.D.J., Holbrook L.H, Ryffel H.H., (2012) . Machinery's Handbook . 29th edition. Industrial Press 234 - 256