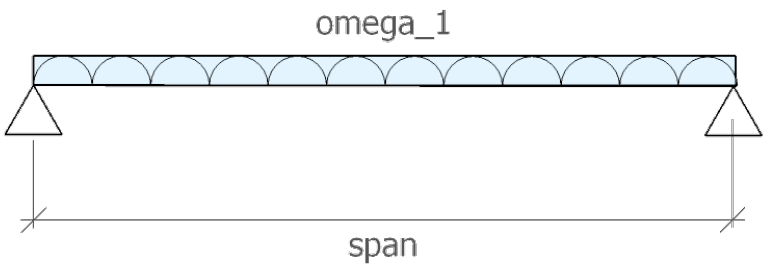


[ 1i ] Load Combinations

Table 1: ASCE 7-05 Load Effects

Equation No.	Load Combination
16-1	1.4(D+F)
16-2	1.2(D+F+T) + 1.6(L+H) + 0.5(Lr or S or R)
16-3	1.2(D+F+T) + 1.6(Lr or S or R) + (f1L or 0.8W)



Beam Geometry

Bending Stress Formula [Eq 1]

$$\sigma_1 = \frac{M_1}{S_1}$$

[ 2v ] Loads and Geometry

Table 2: Beam Loads and Properties

variable	value	[value]	description
D_1	3.80 psf	0.18 kPA	joists DL
D_2	2.10 psf	0.10 kPA	plywood DL
D_3	10.00 psf	0.48 kPA	partitions DL
D_4	1.00 klf	14.59 kN_m	fixed machinery DL
L_1	40.00 psf	1.92 kPA	ASCE7-05 LL

Table 3: Beam Geometry [file: s-beam1-v.csv]

variable	value	[value]	description
W_1	2.00 ft	0.61 m	beam spacing
S_1	14.00 ft	4.27 m	beam span

## Uniform Distributed Loads

dead load : ASCE7-05 2.3.2 [Eq 2]

$$dl_1 = 1.2 \cdot D_4 + 1.2 \cdot W_1 \cdot (D_1 + D_2 + D_3)$$

<b>dl_1</b>	<b>[dl_1]</b>		<b>W_1</b>	<b>D_3</b>	<b>D_4</b>	<b>D_1</b>	<b>D_2</b>
1.24 klf	18.07 kN_m		2.00 ft	10.00 psf	klf	3.80 psf	2.10 psf

live load : ASCE7-05 2.3.2 [Eq 3]

$$ll_1 = 1.6 \cdot L_1 \cdot W_1$$

<b>ll_1</b>	<b>[ll_1]</b>		<b>W_1</b>	<b>L_1</b>
0.13 klf	1.87 kN_m		2.00 ft	40.00 psf

total load : ASCE7-05 2.3.2 [Eq 4]

$$dl_1 = -ll_1 + \omega_1$$

<b>omega_1</b>	<b>[omega_1]</b>		<b>ll_1</b>	<b>dl_1</b>
1.37 klf	19.94 kN_m		128.00 ft·psf	1.24 klf

## [ 3v ] Beam Section Properties

[ Python file read: s-sectprop.py ]

function: rect sect modulus [Eq 5]

$$\text{section}_1 = \text{rectsect}(10 \cdot \text{inch}, 18 \cdot \text{inch})$$

<b>section_1</b>	<b>[section_1]</b>		<b>inch</b>
540.00 in3	8849.01 cm3		inch



function: rect moment inertia [Eq 6]

$$inertia_1 = rectinertia(10 \cdot inch, 18 \cdot inch)$$

inertia_1	[inertia_1 ]		inch
4860.0 in4	202288.5 cm4		inch

[ 4v ] Force and Stress

mid-span UDL moment [Eq 7]

$$m_1 = \frac{S_1^2 \cdot \omega_1}{8}$$

m_1	[m_1 ]		omega_1	S_1
33.47 ftkip	45.38 mkN		1.37 klf	14.00 ft

bending stress [Eq 8]

$$fb_1 = \frac{m_1}{section_1}$$

fb_1	[fb_1 ]		m_1	section_1
743.8 psi	5.1 MPA		33.5 ft2·klf	540.0 inch3

