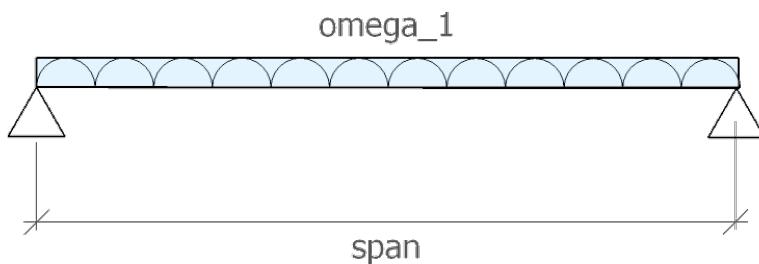


## [ 1i ] Load Combinations

**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]

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

dl_1	[dl_1]		W_1	D_3	D_4	D_1	D_2
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]

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

ll_1	[ll_1]		w_1	L_1
0.13 klf	1.87 kN_m		2.00 ft	40.00 psf

total load : ASCE7-05 2.3.2 [Eq 4]

$$dl_1 = -ll_1 + \omega_1$$

omega_1	[omega_1]		ll_1	dl_1
1.37 klf	19.94 kN_m		128.00 ft·psf	1.24 klf

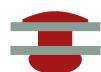
## [ 3v ] Beam Section Properties

[ Python file read: s-sectprop.py ]

function: rect sect modulus [Eq 5]

$$section_1 = rectsect(10\cdot inch, 18\cdot inch)$$

section_1	[section_1]		inch
540.00 in <sup>3</sup>	8849.01 cm <sup>3</sup>		inch



function: rect moment inertia [Eq 6]

```
inertia1 = rectinertia(10·inch, 18·inch)
```

inertia_1	[inertia_1 ]		inch
4860.0 in4	202288.5 cm4		inch

**[ 4v ] Force and Stress**

mid-span UDL moment [Eq 7]

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

m_1	[m_1 ]		omega_1	s_1
33.47 ftkip	45.38 mkN		1.37 klf	14.00 ft

bending stress [Eq 8]

$$f_{b1} = \frac{m_1}{\text{section}_1}$$

f <sub>b</sub> _1	[f <sub>b</sub> _1 ]		m_1	section_1
743.8 psi	5.1 MPa		33.5 ft <sup>2</sup> ·klf	540.0 inch <sup>3</sup>

