Single Doc Example 1

[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)

omega_1

span
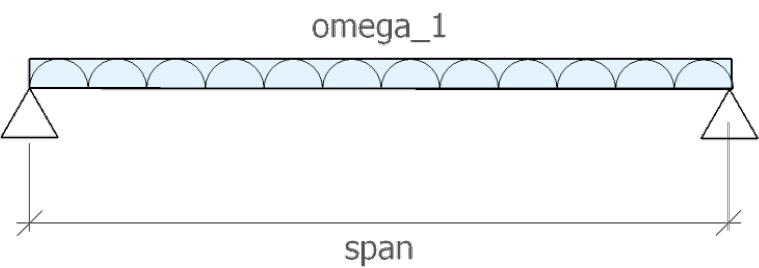
Beam Geometry

Bending Stress **[Eq 1]**

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

[2v] Loads and Geometry

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-O5 LL

Table 2: Beam Geometry [file: beam1.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

dead load : ASCE7-05 2.3.2 **[Eq 2]**

```
dl_1 = 1.2*(D_4 + W_1*(D_1 + D_2 + D_3))
```

dl_1	[dl_1]
1.24 klf	18.07 kN_m

W_1	D_2	D_1	D_3	D_4
2.00 ft	2.10 psf	3.80 psf	10.00 psf	klf

live load : ASCE7-05 2.3.2 **[Eq 3]**

```
ll_1 = 1.6*L_1*W_1
```

ll_1	[ll_1]
0.13 klf	1.87 kN_m

W_1	L_1
2.00 ft	40.00 psf

total load : ASCE7-05 2.3.2 **[Eq 4]**

```
omega_1 = dl_1 + ll_1
```

omega_1	[omega_1]
1.37 klf	19.94 kN_m

dl_1	ll_1
1.24 klf	128.00 ft·psf

[3v] Beam Stress

[Python file read: sectprop.py **]**

<div align="right">function: rect. S **[Eq 5]**</div>

```
section_1 = rectsect(10*inch, 18*inch)
```

section_1	[section_1]
540.00 in3	8849.01 cm3

<div align="right">function: rect. I **[Eq 6]**</div>

```
inertia_1 = rectinertia(10*inch, 18*inch)
```

inertia_1	[inertia_1]
4860.0 in4	202288.5 cm4

<div align="right">mid-span UDL moment **[Eq 7]**</div>

$$m\_1 = \frac{S\_1{}^2 * omega\_1}{8}$$

m_1	[m_1]
33.47 ftkip	45.38 mkN

omega_1	S_1
1.37 klf	14.00 ft

<div align="right">bending stress **[Eq 8]**</div>

$$fb\_1 = \frac{m\_1}{section\_1}$$

fb_1	[fb_1]
743.8 lb_in2	5.1 MPA

section_1	m_1
540.0 inch3	33.5 ft2·klf

stress ratio **[Eq 9]**

```
fb_1 < 20000*lb_in2
```

fb_1	<	20000*lb_in2
0.74 ksi	<	20.00 ksi
:	:	:
0.04	ratio	26.89

>>> OK

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