[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 [Eq 1]

$$\sigma_{\blacksquare} = \frac{M_{\blacksquare}}{S_{\blacksquare}}$$

[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

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

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

L_1	W_1
40.00 psf	2.00 ft

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 **]**

function: rect. S [Eq 5]

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

section_1	[section_1]
540.00 in3	8849.01 cm3

function: rect. I [Eq 6]

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

inertia_1	[inertia_1]
4860.0 in4	202288.5 cm4

mid-span UDL moment [Eq 7]

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

m_1	[m_1]
33.47 ftkip	45.38 mkN

S_1	omega_1
14.00 ft	1.37 klf

bending stress [Eq 8]

```
          m_1
fb_1 = ---------
       section_1
```

fb_1	[fb_1]
743.8 lb_in2	5.1 MPA

m_1	section_1
33.5 ft2·klf	540.0 inch3

stress check [Eq 9]

```
fb_1 < 20000*lb_in2
```

fb_1	<	20000*lb_in2
0.74 ksi	<	20.00 ksi
—-	—-	—-
0.04	ratio	26.89

■[92mok■[00m