[1] Example 0101 - basic template [0101]

This model calculates the mid-span beam moment under uniformly distributed (UDL) floor loads.

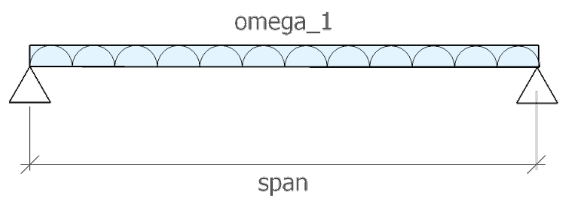

Figure 1.1: Simply supported beam

operation examples:

- [s] section
- [y] sympy and LaTeX symbolic expresssions
- [t] term
- [e] equation
- [#-] format and file operations

reST markup examples:

- lists, **bold**, *italic*
- tables
- raw latex

Notation: (LaTeX block is not processed for UTF calcs)

$$D_n = \text{nominal dead load of material or component n}$$

$$L_n = \text{nominal live load from action n}$$

$$DL_n, LL_n = \text{sum of nominal dead or live loads}$$

$$l_n = \text{effective beam span}$$

$$\omega_n = \text{factored line load on element n}$$

$$M_n = \text{factored bending moment on component n}$$

$$q_n = \text{factored area load n}$$

$$w_n = \text{tributary width n}$$

[2] Beam Loads and geometry [0101]

Dead and live load contributions to beam UDL

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)

Dead loads

```
joists                              | D_1 = 3.8 psf
plywood                             | D_2 = 2.1 psf
partitions                          | D_3 = 10.0 psf
fixed machinery                     | D_4 = 0.5 kips/ft
```

Live loads

```
ASCE7-05                            | L_1 = 40.0 psf
```

Beam tributary width and span

```
distance between beams              | w_1 = 2.0 ft
beam span                           | l_1 = 14.0 ft
```

[3] Maximum bending moment [0101]

DL_1 | Total UDL factored dead load [3.1]

$$1.2 \cdot D_4 + 1.2 \cdot w_1 \cdot (D_1 + D_2 + D_3)$$

$$DL_1 = 0.64 \; kips/ft$$

LL_1 | Total UDL factored live load [3.2]

$$1.6 \cdot L_1 \cdot w_1$$

$$LL_1 = 0.13 \; kips/ft$$

omega_1 | factored UDL [3.3]

$$DL_1 + LL_1$$

$$omega_1 = 0.77 \; kips/ft$$

M_1 | Bending moment at mid-span [3.4]

$$\frac{\omega_1}{8} \cdot l_1^2$$

$$\frac{0.77 kips/ft}{8} \cdot 14.00 ft^2$$

$$M_1 = 18.8 \; ft.kip$$

[4] Symbolic rendering using sympy or LaTeX [0101]

Equation rendered from **SymPy**

[4.1]

$$\sigma = \frac{M}{I} \cdot z$$

Equation rendered from **LaTeX** (expresssion copied from Wikipedia HTML source)

[4.2]

$$\sigma = \frac{Mz}{I} = -zE\,\frac{\mathrm{d}^2 w}{\mathrm{d}x^2}$$

[end of calc]