DESIGNING A STEEL SECTION

\[ f_b = 30 \text{ ksi} \]

\[ W = 40 \text{k} \]

\[ l = 32' \]

For a simply supported uniformly loaded beam,

Maximum moment \( M = \frac{WL}{8} \)

\[ M = \frac{40 \text{k} \times 32'}{8} \]

\[ M = 160 \text{ k} \cdot \text{ft} \]

Now,

\[ f_b = \frac{M_c}{I} = \frac{M}{8} \]

\[ S = \frac{M}{f_b} = \frac{160 \text{ k} \cdot \text{ft}}{30 \text{ ksi}} \]

\[ S = 64 \text{ in}^3 \]

For \( S \geq 64 \text{ in}^3 \), in Table D-36,

Sections appropriate are:

- W 16 x 40
- W 18 x 40
- W 14 x 48 \( \Rightarrow \) Heavier
- W 21 x 44 \( \Rightarrow \) Also heavier but stiffer

\[ S \geq 81.6 \text{ in}^3 \]

...the most economical section

is \( ' W 16 \times 40 ' \).